

RECEPTIVITY TO FEEDBACK: AN INVESTIGATION OF THE INFLUENCE OF
FEEDBACK SIGN, FEEDBACK SPECIFICITY, AND GOAL ORIENTATION

by

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B.S., Nebraska Wesleyan University, 2006

M.S., Kansas State University, 2013

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Psychological Sciences
College of Arts and Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2015

Abstract

This study was designed to examine the combined influence of feedback sign (i.e., positive or negative), feedback specificity, and goal orientation on individuals' receptivity to performance feedback. Performance feedback is an often-prescribed solution to performance problems for both individuals and organizations, but evidence regarding its effectiveness as a mechanism for promoting positive outcomes has been mixed. It has been argued that one reason for the inconsistency in previous research findings may be a failure to adequately account for reactions to feedback (e.g., receptivity). Accordingly, this study focused on a series of variables with the potential to influence receptivity, in pursuit of a more comprehensive understanding of the feedback process. It was expected that individuals with certain achievement goal orientations would be more or less receptive to different characteristics of the feedback itself, and that the nature of the task being performed would further influence their willingness to accept feedback and implement task-relevant behavioral changes. Data were collected from 536 participants via Amazon's Mechanical Turk marketplace. Participants completed the experiment in an online environment. Each participant was asked to complete a pair of error-detection tasks, focused on either mathematical computations or grammatical accuracy. Conditionally-assigned, fabricated feedback was provided after task performance on the initial trial. Surveys were used to assess goal orientation and feedback receptivity. Results indicated that greater feedback specificity was associated with greater receptivity to feedback. Analysis also revealed that feedback sign, feedback specificity, and goal orientation interact to influence receptivity, such that for performance-oriented individuals, specific positive feedback leads to the highest levels of receptivity and specific negative feedback prompts the lowest levels of receptivity. For mastery-oriented participants, however, specific feedback was associated with high levels of receptivity,

regardless of whether that feedback was positive or negative. The results are discussed within the context of relative theoretical perspectives. Practical implications, promising avenues of future inquiry, and strengths and limitations of the research are discussed.

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Acknowledgements

Thank you to my advisor, for all of his guidance (and patience) over the years, and to my committee for all of their thoughtful contributions to this and other projects.

Dedication

To my wife, who constantly reminds me why things are worthwhile.

Receptivity to Feedback: An Investigation of the Influence of Feedback Sign, Feedback Specificity, and Goal Orientation

Performance feedback is one of those constructs that is so intuitive that it has become a fixture in a host of theories targeting other phenomena (e.g., goal setting theory – Locke & Latham, 1990; control theory – Carver & Scheier, 1981a). It goes without saying that feedback plays a critical role in the learning process. Without it, we would not be capable of forming associations between events. It plays an equally critical role in self-regulatory processes. Without it, we would have no information about actual states for comparison with our goals; behavioral change would have no guiding influence. The general feedback process is ingrained in our lives from childhood. When learning to speak, our attempts to form words are met with feedback from our parents. In school, our attempts to solve math problems are met with feedback from our teachers. At work, our attempts to sell various products to customers are met with feedback from our supervisors. At home, our attempts to make a new recipe for dinner are met with feedback from whoever happens to be at the table. We live in a world of feedback loops, and the process is familiar. We perform tasks, we receive information about how well we performed that task, and we respond in some way. And, yet, despite its intuitive nature and our long-standing familiarity with the process, performance feedback frequently does not perform as expected.

In one form or another, psychological research on feedback and its relationship with performance has been in full swing for over a century, and the associated body of literature is plagued by inconsistent results (see Kluger & DeNisi, 1996). The sense that feedback is generally beneficial has persisted, despite evidence indicating that its effects on performance can range from positive to neutral to dramatically negative. The implications of such inconsistency

affect both researchers and practitioners. Unpredictable effects for feedback can certainly derail empirical tests of other, related phenomena (e.g., goal setting interventions; Latham & Locke, 1991). Much more concerning, however, are the implications of unexpected results for practical interventions. Though practitioners' awareness of feedback's potential effects on learning, motivation, and performance is encouraging, the typical expectation that feedback universally promotes positive outcomes may result in negative experiences for all involved parties. The perception of performance appraisals and associated feedback is already dismal in applied settings, with over 75% of employees, managers, and HR executives reporting performance management efforts to be ineffective or inaccurate (CEB Corporate Leadership Council, 2012, as cited in Mueller-Hanson & Pulakos, 2015). Continued, unexpected negative outcomes stemming from attempts to drive improvement may only taint those perceptions further.

Such substantial variability is suggestive of a collection of moderating influences (i.e., conditions that affect the nature of a relationship) on the feedback-performance relationship. Accordingly, understanding how performance feedback influences subsequent performance can be most effectively advanced via an exploration of those moderating influences. In order to identify potential sources of feedback-performance moderators, consideration must be made for the nature of the feedback process itself. Feedback is, in a general sense, "a special case of the general communications process in which some sender conveys a message to a recipient" (Ilgen, Fisher, Taylor, 1979, p. 350). Framing feedback in its most simplistic format clarifies the mechanisms of influence inherent in the process. At its core, there are four operable elements of the feedback process: the source of the message, the message itself, the recipient of the message, and the situation in which the process is embedded. Conceptualized in terms of traditional performance feedback in the workplace, a supervisor (source) communicates an evaluation of a

worker's recent performance (message) to that worker (recipient) during an annual performance review (situation).

The purpose of this research has been to examine the efficacy of a collection of potential moderating influences on the feedback-performance relationship. In particular, this study has been designed to test the combined effects of feedback sign (message), feedback specificity (message), and goal orientation (recipient) on the relationships between feedback, receptivity to feedback, and performance. Though existing research (Anseel, Van Yperen, Janssen, & Duyck, 2011; Davis, Carson, Ammeter, & Treadway, 2005; Van Dijk & Kluger, 2011; VandeWalle, Cron, & Slocum, 2001) has examined many of these variables, a thorough review of the literature revealed no research that simultaneously examined all variables of interest in a single model. By simultaneously investigating this collection of variables, this study expands on the existing literature by testing the interactions between feedback characteristics and personal characteristics, allowing for more definitive conclusions about the effectiveness of catering feedback interventions to individuals' goal-relevant preferences.

Theoretical and Conceptual Models

There are two theoretical models of particular relevance to the feedback process: control theory (Carver & Scheier, 1981a; Klein, 1989) and feedback intervention theory (FIT; Kluger & DeNisi, 1996). Though conceptually related, each offers unique explanatory mechanisms for the relationship between feedback and performance. Control theory explains how feedback influences subsequent behavior (e.g., performance), while feedback intervention theory explains the channels through which feedback information passes en route to influencing performance outcomes.

Control theory. Control theory (Carver & Scheier, 1981a, 1998) represents perhaps the strongest influence on the development of feedback models. It provides an explanation of feedback's role in learning (i.e., behavioral change), and has served as a conceptual framework from which to build more detailed models of the feedback process. Control theory revolves around the simple feedback loop (see Figure 1), which traditionally consists of four elements: the referent standard (i.e., goal), an input function, the comparator, and an output function. In its most simplistic form, an example of a thermostat regulating room temperature is often used (Klein, 1989). In the example, the thermostat itself constitutes the referent standard, the heat sensor represents the input function, and the heater/air conditioner represents the output function. Information from the heat sensor is compared to the temperature set on the thermostat. If the comparison reveals no difference between the two, no action is taken. If, however, the comparison indicates a discrepancy, the heater/air conditioner is triggered to reduce the discrepancy, and the process repeats until the discrepancy is eliminated.

Expanded to human behavior, the process becomes necessarily more complex (Carver & Scheier, 1981a, 1998). Goals take the place of the referent standard, feedback takes the place of the input function, and behavior takes the place of the output function. Multiple goals compete for limited attentional resources (Locke, Smith, Erez, Chah, & Schaffer, 1994); feedback may be absent, ambiguous, inaccurate, or untimely (Kluger & DeNisi, 1996; Locke & Latham, 1990); and the behavioral adjustments needed to reduce discrepancies may be unclear. Further, external circumstances can further disrupt attempts to resolve differences between desired and actual goal states (Lord, Diefendorff, Schmidt, & Hall, 2010). Adding to the already daunting increase in complexity, humans also bring affective responses to the process (Carver & Scheier, 1981a, 1998). Despite the inherent complexity of human behavior, however, the theory's tenets are

reported to be largely supported in the extant literature (Schmidt, Beck, & Gillespie, 2015).

Control theory offers a deceptively simple explanation regarding the importance of performance feedback – it motivates directed changes in behavior and, accordingly, influences performance. However, the inconsistency in feedback research is indicative of basic control theory being too simplistic for guiding predictions for realistic feedback interventions.

Feedback intervention theory. Feedback intervention theory (FIT; Kluger & DeNisi, 1996) was conceptualized in response to the noteworthy absence of a comprehensive model specifically targeting feedback. Though often playing a critical role in theories of motivation (e.g., control theory, goal setting theory), the processes underlying performance feedback itself have received relatively little theoretical exploration. FIT draws heavily upon control theory. Kluger and DeNisi (1996) propose five key arguments underlying the FIT model:

- (a) Behavior is regulated by comparisons of feedback to goals or standards, (b) goals or standards are organized hierarchically, (c) attention is limited and therefore only feedback-standard gaps that receive attention actively participate in behavior regulation, (d) attention is normally directed to a moderate level of the hierarchy, and (e) feedback interventions change the locus of attention and therefore affect behavior. (p. 259).

The authors continue by acknowledging that, of these five arguments, the first four are “largely borrowed” from control theory. In essence, FIT is a magnification of the processes subsumed by control theory’s input function. It is, nevertheless, a much more useful framework (see Figure 2) for explaining and predicting feedback-specific effects and relationships than control theory.

Kluger and DeNisi argued that attention was the key distinction between FIT and control theory, stating:

FIT adds one additional and crucial assumption: [feedback interventions] command, and often receive, considerable attention. [Feedback interventions] are unlikely to be ignored because any [feedback intervention] has potentially serious implications for the self...Because [feedback interventions] receive considerable attention, [feedback interventions] have the capacity to alter the locus of attention. (p. 262).

This emphasis of locus of attention underlies the entirety of FIT. The authors postulated that elements of feedback interventions interact with task and personal characteristics to direct attentional resources. To the extent that attention becomes fixated on the recipient's sense of self, feedback poses a threat to subsequent performance (particularly for complex tasks). On the other hand, attention directed toward the task itself is likely to positively influence performance. According Kluger and DeNisi, feedback directs attention toward three general types of processes, presented hierarchically (top-to-bottom): meta-task processes, task-motivation processes, and task-learning processes. Citing research indicating that people prefer not to focus attention on the self and elements of action identification theory (Wicklund, 1975; Vallacher & Wegner, 1987), the authors argued that "attention is normally directed to a moderate level of the hierarchy, that is, not to the ultimate goals of the self [meta-task processes] or to the detailed components of an ongoing activity" (p. 262).

Because FIT theory operates under the assumption that attention is naturally focused at a moderate point in the hierarchical structure, it makes logical sense to consider task-motivation processes first. To the extent that there is no feedback-standard discrepancy, an individual can be expected to maintain existing levels of effort. When such a discrepancy is detected, however, the direction of the feedback (positive/negative, i.e., feedback sign) affects behavioral planning. If the feedback sign is positive, FIT suggests that the recipient will consider whether improved

performance will serve the pursuit of other goals. If so, he or she can be expected to adjust the referent standard upward, and increase effort accordingly. If not, the recipient can be expected to reduce effort to reduce the discrepancy. If the feedback sign is negative, however, the process becomes more complex. Initially, the recipient can be expected to increase effort to reduce the feedback-standard discrepancy. If it works, he or she will continue to increase or maintain that effort to minimize the discrepancy. If it does not, the recipient can be expected to shift attention toward either task-learning processes or meta-task processes, depending upon whether they believe themselves capable of matching the standard in the future (Kluger & DeNisi, 1996).

Provided that negative feedback has prompted a shift in attentional resources from task-motivation processes to task-learning processes, the recipient can be expected to reconsider their approach to the task, by developing and testing new strategies. Though efforts to improve task learning can improve performance, the effect is certainly not guaranteed. For recipients with extensive task experience, consideration of new task strategies can interfere with previously automatic behaviors (Vallacher & Wegner, 1987). In addition, if a recipient inaccurately assesses the effectiveness of new task strategies, their subsequent use of the strategies can result in decreased performance. Performance can, however, increase over time if consideration of new strategies results in a recipient testing, accepting, and transferring a novel, effective approach (Kluger & DeNisi, 1996).

In the context of FIT theory, meta-task processes include: “mode of resolving feedback-self discrepancies, attention to the self, depletion of cognitive resources for task performance, and affective processes” (Kluger & DeNisi, 1996, p. 265). Under most circumstances, a shift in attentional resources toward meta-task processes will reduce subsequent performance. Essentially, unless the recipient determines that the focal task is important to attaining self-

relevant goals (e.g., impression management) *and* the task is a simple one, performance can be expected to decrease once attention has become self-focused. If the task is difficult, performance suffers as a result of attentional depletion, and if the task is not deemed critical to a self-relevant goal, there is even greater depletion of attentional resources (Kanfer & Ackerman, 1989).

Kluger and DeNisi (1996) also identified a number of mechanisms with the potential for influencing shifts in attention: cues inherent in the performance feedback (i.e., feedback characteristics); characteristics of the task being performed; and characteristics of the situation/person. FIT posits that feedback content focused on normative comparisons, certain combinations of self-related personality characteristics and feedback sign (e.g., negative feedback for a recipient with low self-esteem), and a rich feedback medium all are likely to increase attentional focus on meta-task processes. Longitudinal performance information and greater feedback specificity, on the other hand, should result in more task-focused attention.

It is important to acknowledge that these types of processes do not occur in a vacuum. In a realistic setting, recipients can be expected to be attending to all of these processes virtually simultaneously. Decisions made with regard to one process may sequentially influence decisions made in another. For example, receiving negative feedback may prompt both affective change and encourage revision of task strategy. Attempts to revise task strategies may, in turn, result in a sense of frustration that further affects affective states, requiring reconsideration of the importance of task success.

Receptivity to Feedback

In their seminal article on reactions to feedback, Ilgen et al. (1979) presented a model of the feedback process that accounted for the cognitive processes at play during the span between receiving feedback and responding (see Figure 3). They argued that after receiving feedback,

there are four distinct cognitive operations that take place: perception of feedback, acceptance of feedback, desire to respond to feedback, and selection of an intended response. Each operation was conceptualized as a sequential mediator (in the order listed above), with perceptions of feedback expected to exhibit an additional, direct relationship with the individual's response intentions. Further, the authors accounted for the role of various individual difference characteristics in influencing each cognitive operation.

In Ilgen et al.'s (1979) model, references to both feedback perceptions and acceptance of feedback are focused primarily on evaluations of the accuracy of the feedback received. The authors cite a number of factors that contribute to such evaluations. In particular, the credibility of the source of feedback, feedback timeliness, feedback sign (i.e., positive or negative), and the frequency with which a given source provides performance feedback were set forth as influential concerns. Each has exhibited a positive relationship with perceptions of feedback accuracy, meaning that, as perceived credibility, timeliness, positivity of feedback, level of detail, and frequency of provision increase, there is a greater likelihood of the individual concluding that the feedback is an accurate assessment of their performance (Albright & Levy, 1995; Brett & Atwater, 2001; Podsakoff & Farh, 1989; Steelman & Rutkowski, 2004; Stone & Stone, 1985). Ilgen et al. (1979) also proposed that experience with the task at-hand, locus of control, self-esteem, and social anxiety would moderate responses to different kinds of feedback. For example, the authors cited research demonstrating that individuals with an internal locus of control (Baron, Cowan, & Ganz, 1974) and high self-esteem (Weiss, 1977) responded more positively to feedback provided by the task, whereas those with an external locus of control and low self-esteem were more responsive to feedback provided by an external agent.

If a recipient perceives the feedback as accurate, and subsequently accepts it, the next relevant cognitive stages are willingness to respond in a feedback-consistent manner and establishment of a system of intended behaviors (Ilgen et al., 1979). As willingness to act is primarily a matter of motivation, reinforcement and expectancy theories offered valid bases from which to identify potentially critical considerations. Though Ilgen et al. presented feedback's potential as a reinforcer in its own right, conceptualizing "utilizing feedback" as the focal behavior in a traditional operant system seems more clear-cut. By utilizing accurate, constructive feedback effectively, an employee can enhance performance, and in turn, obtain desired rewards. Such considerations are akin to the connections underlying Vroom's (1964) expectancy theory. To the extent that associated outcomes are perceived as valuable, obtainable, and within the recipient's control, willingness to respond and establish intended behaviors should be relatively high. Situational and personal factors that discourage such perceptions (i.e., external locus, previous negative experiences) should be expected to reduce willingness to act, accordingly. In the years since its conception, research directly testing Ilgen et al.'s (1979) framework has confirmed its predicted sequential relationships (Kinicki, Prussia, Wu, & McKee-Ryan, 2004).

Operationalization. Despite conceptual and empirical evidence supporting the distinction among the cognitive elements of feedback processing (Ilgen et al., 1979; Kinicki et al., 2004; Taylor, Fisher, & Ilgen, 1984), the intertwined nature of these elements makes an overall measure of receptivity more practical for interpretation and statistical application. The similarity between items designed to measure feedback perceptions and acceptance of feedback (e.g., perceived accuracy - "The feedback was an accurate evaluation of my performance on the task," Stone & Stone, 1985; feedback acceptance - "I do not agree with the feedback provided,"

Anseel & Leivens, 2009) is reflective of the substantial conceptual overlap between the two constructs. Likewise, desire to respond and intention formation also demonstrate a high degree of overlap with regard to item content. Further, measuring a composite form of receptivity to feedback has been successful, with regard to internal consistency ($\alpha > 0.80$; Ryan, Brutus, Greguras, & Hakel, 2000). Consideration of likely response curves is also suggestive of the efficacy of an overall scale of receptivity, as perceptions of inaccuracy could be expected to reduce the likelihood of affirmative responses to items measuring the subsequent processing in Ilgen et al.'s (1979) model.

Characteristics of Feedback

As noted previously, characteristics of the message (e.g., feedback sign, level of specificity) can influence the feedback process. Such characteristics have the potential to directly affect the cognitive processes that comprise receptivity to feedback (i.e., perceptions of accuracy, willingness to act; Ilgen et al., 1979), direct attention, and prompt affective reactions to feedback (Kluger & DeNisi, 1996). The amount of control that can be exercised by the feedback sender with regard to feedback characteristics makes them a particularly appealing focus for research efforts. Identification of those characteristics that can be actively manipulated to cater messages toward desirable outcomes would constitute a substantial contribution within both research and applied settings.

Feedback sign. Popular models of performance feedback consistently recognize the importance and influence of feedback sign (positive or negative) in associated reactions and outcomes (Fedor, 1991; Ilgen et al., 1979; Kluger & DeNisi, 1996; Taylor et al., 1984). In general, positive feedback (as contrasted to negative feedback) is viewed as more accurate, and is thus more likely to be accepted (Ilgen et al., 1979; Stone & Stone, 1985). Positive feedback is

also viewed more favorably, resulting in more positive affective responses (Anseel & Leivens, 2006; Atwater & Brett, 2005; Love, Love, & Northcraft, 2010) and greater focus on attending to task-relevant information (Butler, 1987; Kluger & DeNisi, 1996). Further, evidence suggests that receiving positive feedback over time promotes upward goal-revision (increased challenge), driving increased performance (Ilies & Judge, 2005). At the surface level, these trends suggest that provision of positive feedback should promote greater satisfaction with feedback, a greater likelihood of fully processing feedback, and better subsequent performance. However, despite its pervasiveness in such models, the manifestation of the effects of feedback sign is not always intuitive.

First and foremost, uniform provision of positive feedback is not a viable solution over the long term. Using such a strategy would inevitably reduce the perceived credibility of the feedback source, reducing the likelihood for thorough processing. It may also contribute to a system of distrust in management, accompanied by a host of associated ill-effects (e.g., turnover, low organizational performance; see McCauley & Kuhnert, 1992). Uniformly positive feedback would also fail to address deficiencies in performance and could create legal dilemmas related to administrative decisions (e.g., promotion, termination) as a result of a failure to accurately portray performance differences between employees. Given that some amount of negative feedback plays a critical role in maintaining a well-functioning workforce, researchers have explored a number of factors that may moderate the relationship between feedback sign and receptivity to feedback.

There is evidence that the overall pattern of feedback plays a critical role in predicting reactions. For example, consistent with the tenets of control theory, negative feedback early in one's experiences with a given task has been found to increase motivation to perform and

subsequent performance, particularly for individuals with high levels of ability (Podsakoff & Fahr, 1989). Consistent, negative feedback over time, however, has been found to contribute to a sense of helplessness, resulting in decreased performance, motivation, and affect (Nease, Mudgett, & Quinones, 1999). Individual differences, especially those related to self-concept, have also been found to moderate reactions to positive and negative feedback. Persons with high task-relevant self-efficacy are less receptive to negative feedback than are those with low self-efficacy (Nease et al., 1999). Similarly, those with low self-esteem are more likely to display decreased performance after negative feedback than are those with high self-esteem (Brockner, Derr, & Laing, 1987; Fedor, Davis, Maslyn, & Matheson, 2001). Characteristics of the tasks being performed also moderate the effects of feedback sign on performance. Simply framing a task as a “learning” task, as opposed to a “performance” task, attenuates the negative impact of negative feedback substantially (Cianci, Klein, & Seijts, 2010).

Feedback specificity. Traditionally, feedback specificity refers to the timing, content, and level of detail present in the feedback messages provided. A message is considered to be higher in specificity when it is provided immediately after performance and contains detailed, task-focused information (Goldstein, Emmanuel, & Howell, 1968; Goodman & Wood, 2004). Each of these facets contributes to heightened understanding of task processes needed for success by improving recipients’ ability to connect feedback information to actual performance. More immediate feedback is more likely to be perceived as accurate, and is easier for recipients to compare to actual events (Ilgen et al., 1979). Feedback focusing on task-relevant processes, as opposed to only outcomes, promotes greater recipient focus on the task itself and provides more actionable information for behavioral adjustments (Feys, Anseel, & Wille, 2011; Kluger &

DeNisi, 1996). Likewise, greater detail clarifies the information received, facilitating integration with one's existing understanding of the task.

Goal Orientation

In addition to the characteristics of feedback provided, the feedback process can be influenced by characteristics possessed by the recipient (Ilgen et al., 1979; Kluger & DeNisi, 1996). Unlike feedback characteristics, however, individual differences amongst recipients are much more difficult to actively manage in the workplace. Though technically possible to assess trait-level tendencies and select on that basis, doing so without first establishing a trait as essential for successful job performance constitutes a substantial threat to legal defensibility (EEOC, 1978). There is also substantial evidence that, over time, trait-like individual difference variables are malleable to experience, even within the realm of performance feedback (e.g., self-esteem; Kernis, Cornell, Sun, Berry, & Harlow, 1993; Rosenberg, 1986). Finally, and of relevance to the variable of interest (i.e., goal orientation), certain task characteristics can prime cognitions that are consistent with patterns underlying dispositional characteristics (Elliott & Dweck, 1988; Ilgen & Davis, 2000). Nevertheless, personal characteristics are often conceptualized as relatively stable over time, and for the purposes of this research, goal orientation has been treated as a dispositional construct.

Originally developed by Nicholls, Dweck, and their colleagues (Dweck & Bempechat, 1983; Dweck & Elliott, 1983; Maehr & Nicholls, 1980; Nicholls, 1984), the goal orientation construct is a component of achievement goal theory. Initially, these researchers sought to explain why children of similar intelligence exhibited dramatically different levels of performance in educational settings. Their early research (e.g., Diener & Dweck, 1978, 1980) revealed that while some children displayed "helpless," maladaptive patterns of cognition, affect,

and behavior when presented with challenging tasks, others responded with an adaptive focus on “mastery.” According to Dweck and Leggett (1988), the helpless response pattern “is characterized by an avoidance of challenge and a deterioration of performance in the face of obstacles,” while the mastery-oriented pattern “involves the seeking of challenging tasks and the maintenance of effective striving under failure” (p. 256). Achievement goal theory posits that differences in individuals’ underlying goal preferences steer an individual toward one pattern or the other (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984). Early conceptualizations of achievement goal theory identified two types of goal preferences (i.e., goal orientations) that fostered helpless and mastery-oriented patterns: learning goals and performance goals (Dweck & Bempechat, 1983). With the later expansion of achievement goal theory beyond educational settings, several researchers called for retitling learning goals to mastery goals (Ames, 1992; Elliot, 2005).

Mastery goals are those for which “individuals are concerned with increasing their competence” (Dweck & Leggett, 1988, p. 256). An orientation toward such goals (i.e., a mastery goal orientation) has consistently been associated with displaying the aforementioned mastery-oriented pattern of cognition, affect, and behavior (Butler, 1987; Meece, Blumenfeld, & Hoyle, 1988). This approach to task completion is accompanied by a focus on the task and its parameters, as opposed to characteristics of the self. As such, encountering obstacles results in increased attention to successful task completion, as opposed to immediate consideration and revision of one’s self-concept (Dweck & Leggett, 1988). In fact, given the reciprocal nature of task performance and self-efficacy, individuals’ heightened focus on task performance actually contributes to a more positive self-concept (Bandura, 1997; Phillips & Gully, 1997). Those high (as compared to low) in mastery goal orientation are also more likely to monitor goal progress

and task understanding (Schmidt & Ford, 2003; Wolters, 1998), view feedback as a critical component in improving performance (VandeWalle & Cummings, 1997), and display a high level of motivation to learn (Colquitt & Simmering, 1998). In combination, these results suggest that individuals high in mastery goal orientation will be more receptive to feedback and more likely to integrate feedback into future behavior (Ilgen et al., 1979; Kluger & DeNisi, 1996).

Performance goals, on the other hand, are those for which “individuals are concerned with gaining favorable judgments of their competence” (Dweck & Legett, 1988, p. 256). Performance goals are, by their very nature, focused on one’s ego. As a result, an individual with high performance goal orientation is likely to consider any feedback received through the lens of their self-concept, reducing attentional resources that could be focused on the task at-hand, and decreasing the effectiveness of that feedback (Kluger & DeNisi, 1996). Interestingly, despite the clear-cut implications of performance goal orientation with regard to FIT, early goal orientation research was plagued by inconsistency. Some authors found that high performance goal orientation was associated with maladaptive patterns (Elliot & Dweck, 1988; Meece et al., 1988; VandeWalle et al., 2001), while others found it to be associated with adaptive patterns (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; VandeWalle et al., 2001). In response to these inconsistent findings, Elliot and Harackiewicz (1996) advocated for separating performance goals into two more narrowly defined goal types, on the basis of differentially activated motivational processes: performance-approach goals, characterized by attempts to achieve and demonstrate competence relative to perceived peers; and performance-avoidance goals characterized by attempts to avoid the perception of incompetence relative to peers. The distinction between orientations toward performance-approach and performance-avoidance goals

has been supported by subsequent data (Elliot & Church, 1997; Elliot & McGregor, 2001; VandeWalle, 1997).

Empirical support for the conceptual and practical differences between performance-approach goals and performance-avoidance goals prompted further consideration of mastery goals. Elliot and colleagues argued that the traditional conceptualization of mastery goals was essentially an approach mentality, characterized by pursuit of task mastery (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). The authors carried forward the logic that had been applied to performance goals, and argued that mastery-avoidance goals (i.e., goals with “a focus on avoiding self-referential or task-referential incompetence”; Elliot, 2005, p. 61) likewise offered a unique pattern of cognition, affect, and behavior. Efforts to confirm the four-factor model of goal orientation (performance-approach, performance-avoidance, mastery-approach, mastery-avoidance) have found support via confirmatory factor analyses (Baranik, Barron, & Finney, 2007; Elliot & McGregor, 2001; Finney, Pieper, & Barron, 2004). Subsequent empirical evidence suggests mastery-avoidance goals prompt more adaptive responses than do performance-avoidance goals, but fewer than mastery-approach goals (Conroy, Elliot, & Hofer, 2003; Malka & Covington, 2004).

Current Study

The purpose of the current study is to examine the combined influence of feedback characteristics and personal characteristics on the reception of performance feedback. In so doing, this research provides information about the viability of different types of feedback for individuals with certain characteristics. More specifically, this study examines the extent to which feedback sign, feedback specificity, and goal orientation combine to influence the sequential relationship between performance feedback and receptivity to feedback, and in turn,

the extent to which receptivity to feedback mediates the relationship between feedback and performance. By clarifying the manner in which these variables interact, this research simultaneously expands upon the extant literature and offers valuable insights for the development of feedback interventions in applied settings.

For the sake of constructing the conceptual model to be tested, it is logical to begin with a simplistic conceptualization, and add complexity one element at a time. Accordingly, the starting point for this model lies in the common understanding of performance and performance feedback, derived from control theory (Carver & Scheier, 1981a; Klein, 1989). An individual performs a task, receives performance feedback, compares the feedback to their goal, and performs the task again with behavioral adjustments. Using this framework, suboptimal performance is met with negative feedback, motivating positive performance changes to reduce the feedback-standard discrepancy. However, as meta-analytic research has demonstrated, this simplified version of events is not consistently supported in empirical studies (Ilgen et al., 1979; Kluger & DeNisi, 1996).

To combat the inconsistent findings of research based on control theory's discrepancy reduction loop, the model must be revised to include an explanatory mechanism for differences in the effects of feedback on performance. Ilgen et al.'s (1979) model of the feedback process proposed that the relationship between feedback and performance is mediated by a sequential series of cognitive processes: feedback perception, feedback acceptance, desire to respond to feedback, and selection of an intended response. Empirical research testing Ilgen et al.'s proposed model has confirmed the role of these reactions to feedback as a mediator of the relationship between feedback and performance (Kinicki et al., 2004). Given the conceptual and psychometric overlap between these mediating processes, they have been combined into a single

overarching variable for this research (i.e., receptivity to feedback), which was expected to mediate the effects of feedback on performance.

*Hypothesis 1: Receptivity to feedback mediates the effects of task feedback on subsequent performance.*¹

Ilgen et al. (1979) recognized the importance of considering moderating influences on the relationship between feedback and associated reactions. The authors specifically discussed the effects of source credibility, feedback timing, feedback frequency, and feedback sign on perceived accuracy and acceptance. Of those, three were held constant by using electronic task and feedback administration in the current study: source credibility, feedback timing, and feedback frequency. Feedback sign, however, is a key variable of interest. Research on the effects of feedback sign on both receptivity to feedback and task performance yields relatively consistent results. Positive feedback is perceived as more accurate (Ilgen et al., 1979; Stone & Stone, 1985), is more likely to prompt positive affective responses (Anseel & Leivens, 2006; Atwater & Brett, 2005; Love et al., 2010), and is more likely to result in attention to task-relevant information (Butler, 1987; Kluger & DeNisi, 1996). Considered in combination, these relationships between positive feedback sign and perceptions of accuracy, positive affect, and greater attention to the task itself are indicative of positive influence on feedback receptivity. As such, it was expected that:

Hypothesis 2: Positive feedback results in greater receptivity to feedback than does negative feedback.

Objectively, performance feedback is simply performance information that has been conveyed to a recipient (Ilgen et al., 1979). The utility of the information is, in large part, a

¹ The hypothesized mediation takes into account moderators proposed in subsequent hypotheses.

function of its content. Feedback low in specificity provides general information about the outcomes of earlier performance, but lacks details about steps the recipient can take to improve (Goodman & Wood, 2004). In contrast, feedback high in specificity is high in detail and primarily focused on the task and its processes. That increase in task-oriented detail promotes a greater understanding of task-related behaviors that lead to success or error (Baron, 1988; Goldstein et al., 1968). Accordingly, high feedback specificity should encourage generation of more accurate predictions with regard to the impact of behavioral change on performance, leading to more successful attempts at task-related learning (Kluger & DeNisi, 1996), and stronger intentions to adjust task behavior. Further, greater detail should foster a greater sense of clarity (Fedor, 1991), encouraging acceptance of feedback. Thus, it was expected that:

H3: Feedback high in specificity results in greater receptivity to feedback than does feedback low in specificity.

The manner in which feedback sign and feedback specificity may interact with one another is somewhat unclear in the extant literature. According to FIT, task-learning processes are most likely when an individual has encountered a negative feedback-standard discrepancy. As task-learning processes unfold, high feedback specificity should improve the learning process by offering more detailed information about how to approach the task successfully. However, negative feedback is also frequently accompanied by greater attention to the self and greater negative affect (Kluger & DeNisi, 1996). In the face of negative affective responses, increased detail may hinder the recipient's ability to defend his or her self-concept by shifting blame to an external influence (Ilgen & Davis, 2000). A recent study testing the interaction between feedback sign and specificity found that more detailed negative feedback was, indeed, viewed

more unfavorably than was less detailed negative feedback (Feys et al., 2011). Thus, it was expected that:

H4: Feedback sign and feedback specificity interact to influence receptivity to feedback.

H4a: For negative feedback, greater feedback specificity results in lower receptivity to feedback.

With regard to the influence of feedback specificity on receptivity to positive feedback, the existing literature is similarly unclear. Though Feys et al. (2011) did find an interaction between informational specificity and feedback sign on *unfavorable* reactions to feedback, they found no such effect on *favorable* reactions. By extension, the finding seems to suggest that changes in feedback specificity may not influence receptivity to feedback differently when feedback is positive. FIT is somewhat ambiguous, with regard to recipients engaging in task-learning processes in response to positive feedback-standard discrepancies (Kluger & DeNisi, 1996). However, FIT does suggest that, when faced with a positive feedback-standard comparison, an individual will increase effort if they engage in upward goal revision. Given that increased feedback specificity should clarify steps that can be taken for improved performance, it follows that greater specificity would facilitate a greater propensity for upward goal revision, a notion that is consistent with goal setting theory (Locke & Latham, 1990). Thus, it was expected that:

H4b: For positive feedback, greater feedback specificity results in greater receptivity to feedback.

Potential interactions between feedback processes and individual differences are included in each of the major models of the feedback process (Ilgen et al., 1979; Kluger & DeNisi, 1996; Taylor et al., 1984). Though many individual difference variables (e.g., self-esteem, self-efficacy) have been examined in these frameworks, achievement goal orientation represents one

of the more promising variables in the pursuit of understanding the role of dispositional characteristics in the feedback process. Goal orientation's simultaneous consideration for individuals' interest in protecting their egos and desire to develop competence makes the variable especially relevant to the above-referenced models. Conceptually, given that individuals who espouse a performance goal orientation are primarily concerned with ego-protection (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984), it follows that performance-oriented individuals will display more positive reactions to positive feedback than to negative feedback (Ilgen & Davis, 2000). For individuals who espouse mastery goal orientations, however, focus on task-related competence should serve as a buffering mechanism between negative feedback and negative affect (Kluger & DeNisi, 1996). As a result of the associated affective resilience, it follows that, for mastery-oriented individuals, feedback sign should not exert substantial influence on receptivity to feedback. Thus, it was expected that:

H5: Goal orientation and feedback sign interact to influence receptivity to feedback.

H5a: For participants who predominantly hold performance goal orientations, positive feedback results in greater receptivity to feedback than does negative feedback.

H5b: For participants who predominantly hold mastery goal orientations, positive and negative feedback do not differentially impact receptivity to feedback.

The existing literature suggests that an exploration of the interactions between dispositional and feedback characteristics may explain the wide-ranging inconsistencies in the results of feedback research (Ilgen et al., 1979; Kluger & DeNisi, 1996). The unique combinations of feedback sign and specificity would seem to carry interesting implications for the unique cognitive and behavioral approaches taken by individuals with different achievement goal orientations. Those with performance goal orientations are driven largely by ego-

maintenance, suggesting an overarching preference for positive feedback (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984). Further, because highly specific positive feedback contains greater detail about the individual's superior competence, it was expected that specific, positive feedback would be received more positively than general, positive feedback. With regard to negative feedback, however, the ego-threatening characteristics of negative performance information would be augmented by greater specificity. Accordingly, it was expected that for those with performance orientations, less specific negative feedback would be preferable to more specific negative feedback.

H6: Goal orientation, feedback sign, and feedback specificity interact to influence receptivity to feedback.

H6a: For participants who are predominantly performance-oriented, receptivity to feedback is greatest for specific positive feedback, and lowest for specific negative feedback.

In contrast to performance goal orientations, mastery goal orientations focus effort primarily on increasing actual competence, as opposed to perceived competence (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984). Whereas performance-oriented individuals are focused on ego-defense, mastery-oriented individuals are primarily focused on developing task competence. As such, mastery-oriented individuals should be more resilient in the face of negative feedback, while favoring more specific feedback that promotes task learning (Ilgen & Davis, 2000; Kluger & DeNisi, 1996; Nicholls, 1984). Thus, it was expected that:

H6b: For participants who are predominantly mastery-oriented, receptivity to feedback is greatest for specific positive feedback, and lowest for general negative feedback.

Achievement goal orientation can be further characterized by propensities to actively pursue goal attainment, or conversely, to avoid goal failures (Elliot & Harackiewicz, 1996; Elliot, 2005).

Whereas a performance-approach orientation motivates seeking favorable judgments and visibly demonstrating competence, a performance-avoid orientation promotes avoidance of unfavorable judgments and demonstration of incompetence. As noted above, a propensity toward either performance-approach or performance-avoid can be expected to facilitate greater receptivity to positive feedback interventions. Preferences for the specificity of positive and negative feedback may differ between performance-approach and performance-avoid individuals, however. For example, greater performance-avoid goal orientation may foster resilience in the face of negative feedback, provided that the feedback is sufficiently specific to inform efforts to avoid future displays poor performance (Elliot, 2005). Though no formal hypothesis was tested to explore these potential effects, interactions between feedback sign, feedback specificity, and goal orientation (including the approach/avoid distinction) were analyzed with the intent to explore such effects.

Method

Participants

Power analysis conducted using G*Power 3 indicated that, for the initially intended statistical approach, a sample of 500 participants would ensure adequate statistical power ($1 - \beta > 0.80$) for detecting small to moderate effect sizes ($\eta_p^2 = 0.05$; Faul, Erdfelder, Lang, & Buchner, 2007). Accordingly, data were collected from a total of 536 participants (61.6% Female, Average Age = 36.9 years, 80.2% White). Self-reported occupational titles included a range from unemployed to student to engineers, and 90.2 percent of the sample reported having attended or graduated from post-secondary institutions.

Participants in this study were drawn from Amazon's Mechanical Turk (MTurk) marketplace. As is typical for studies posted to MTurk, a monetary inducement (\$1.00) was offered for participation. MTurk is often used for psychological research, as it offers an opportunity for collecting data from a more heterogeneous population, allowing for greater generalizability of results than would data collected from more traditional participant pools (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012). The average age of participants using MTurk also contributes to its generalizability beyond university classrooms and entry-level employment (Paolacci, Chandler, & Ipeirotis, 2010). Further, research has demonstrated that samples drawn from MTurk display similar levels of attentiveness and psychometric consistency, when compared to traditional student samples (Buhrmester et al., 2011; Paolacci et al., 2010).

Though the average age and demographic characteristics of samples drawn from MTurk are more representative of the workforce in the United States than are samples consisting of undergraduate students, the tenability of generalizing conclusions derived from MTurk samples to the workplace is unclear. However, given the largely theoretical nature of this research, use of a non-work sample to verify hypothesized effects and relationships was deemed warranted.

Procedure

Upon accessing the experiment via electronic means, potential participants were first presented with the informed consent information (see Appendix A), and given an opportunity to consent to, or decline, participation. Consenting participants then progressed to a brief demographic survey (see Appendix C), followed by an 18-item instrument assessing trait goal orientation (see Appendix D). After completing the instrument, participants were presented with a description of the experimental task to which they had been assigned (see Appendices E & F). Each participant was randomly assigned to one of two task types: a numerical task or a verbal

task. Participants were then asked to perform the task for five (5) minutes, at which point, the task was stopped. Upon advancing to the next screen, participants were presented with fabricated feedback, the nature of which was dependent on conditional assignment (see Appendices G-J). Participants were randomly assigned to receive either positive or negative feedback, and also to receive feedback that was either low or high in specificity (e.g., positive, specific feedback or negative, general feedback). Participants were given the opportunity to read the feedback, and advanced to the next screen when they chose to do so. A brief series of items designed to assess the participants' understanding of the feedback they have received was presented next, followed by a measure of receptivity to feedback (see Appendix K). Upon completing that instrument, participants were again presented with task instructions, and the second performance trial subsequently began. After five (5) minutes had passed, the trial ended, and participants were presented with a brief series of items to assess their use of feedback in approaching the second trial. When finished, participants were debriefed (see Appendix B), and participation in the study subsequently ceased. Please see Figure 4 for a depiction of the study's procedural flow.

Measures and Manipulations

Experimental tasks. In order to assess the consistency of predicted effects across various types of task content, this research employed two experimental tasks, dependent on conditional assignment: detection of errors in arithmetic calculations and detection of grammatical errors in sentences. In both cases, participants were asked to review a series of items (i.e., equations or sentences) and identify which are correct or incorrect, within a five-minute time limit. For the numerical task, equations consisted of basic mathematical operations (e.g., addition, multiplication) using four integers. Errors in the equations were made with

regard to the order of mathematical operations. For the verbal task, sentences were of varying lengths and content (akin to sentences used for detecting errors in standardized testing). Errors in the sentences stemmed primarily from violation of grammatical rules (e.g., misuse of pronouns, issues with sentence structure). As in research using similar tasks in the past (Van Dijk & Kluger, 2011), 40 percent of the items contained errors.

Feedback sign. Feedback sign was manipulated via fabricated feedback, according to conditional assignment. Participants receiving positive feedback were informed that their performance on the task was “above average,” having scored in the 81st percentile. Those receiving negative feedback were informed that their task performance was “below average,” having scored in the 29th percentile. To clarify the manipulation, participants also received a brief explanation of percentiles in a manner understandable to a layperson (e.g., “Ranking in the 81st percentile means that you outperformed 81% of your peers”). All participants were informed that their performance feedback was fabricated during debriefing procedures.

Feedback specificity. Feedback specificity is typically operationalized in an additive manner (Davis et al., 2005; Feys et al., 2011; Goodman & Wood, 2004). Low specificity is typically comprised of general information focused on outcomes. Specificity increases as more detailed, task-focused information is added to the available outcome-based information. Increased specificity is also accompanied by recommendations for improvement. Accordingly, in this study, participants received one of two levels of feedback specificity, on the basis of conditional assignment. In the low specificity condition, participants were provided with general, outcome-oriented feedback (see Appendices G & I). Given the fabricated nature of the feedback being provided, low specificity feedback was focused on relative over- or under-performance compared to a faux peer group (e.g., “You detected five more errors than the

average participant in this study completes”). Participants in the high specificity condition received detailed, process-oriented feedback in addition to the normatively-framed outcome information provided in the low specificity condition (see Appendices H & J). Because the feedback is both fabricated and formulaic, increased detail will actually focus on general task process mechanisms (e.g., “To be successful on the next trial, keep the order of operations in mind: 1) parentheses, 2) exponents, 3) multiplication and division, and 4) addition and subtraction”).

Goal orientation. Goal orientation was measured using a revised version of Baranik et al.’s (2007) instrument for measuring goal orientation in work domains (see Appendix D). The instrument employs a four-factor structure consistent with the notion that achievement goals can be approached in four conceptually unique ways: mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance (Elliot, 2005; Elliot & McGregor, 2001). The authors built upon a previous tripartite instrument developed by VandeWalle et al. (2001) that did not include a mastery-avoid subscale. For all subscales, participants were asked to respond on a 7-point, Likert-type scale with responses ranging from 1 (not at all true of me) to 7 (very true of me).

Mastery-approach. The mastery-approach subscale ($\alpha = 0.87$) consisted of four items designed to measure the extent to which an individual seeks to develop task competence, for the sake of mastering the task (e.g., “I am willing to set myself a challenging task goal that I can learn a lot from”). Reliability coefficients for the mastery-approach subscale typically exceed 0.80 (Baranik et al., 2007; VandeWalle et al., 2001).

Mastery-avoid. The mastery-avoid subscale ($\alpha = 0.84$) consisted of six items designed to measure the extent to which an individual strives to avoid feelings of absolute or intrapersonal

incompetence (e.g., “My goal is to avoid being incompetent when performing tasks”). The authors reported a reliability coefficient of 0.82 for the mastery-avoid subscale (Baranik et al., 2007).

Performance-approach. The performance-approach subscale ($\alpha = 0.82$) consisted of four items designed to measure the extent to which an individual seeks to pursue task successes in an effort to be perceived as competent by his or her peers (e.g., “I like to show that I can perform better than my peers”). Reported Cronbach’s α ’s for the performance-approach subscale are typically greater than 0.80 (VandeWalle et al., 2001).

Performance-avoid. The performance-avoid subscale ($\alpha = 0.87$) consisted of four items designed to measure the extent to which an individual strives to avoid task failures and the perception of peers that he or she lacks competence (e.g., “Avoiding a show of low ability is more important to me than learning a new skill”). Reliability estimates for the performance avoid subscale are reported to be greater than 0.75 (Baranik et al., 2007; VandeWalle et al., 2001).

Feedback receptivity. Receptivity to feedback was measured using an 8-item scale developed for the purpose of this study ($\alpha = 0.88$; see Appendix K). In order to encompass an overall conceptualization of receptivity to feedback, the scale included items targeting both perceptions of accuracy ($\alpha = 0.84$; e.g., “I think that the feedback I received was accurate”) and perceptions of feedback utility ($\alpha = 0.84$; e.g., “After reading the feedback, I am looking forward to improving on the next trial”). In combination, these sub-facets summarize the commonly-accepted cognitive processes underlying reactions to feedback (Ilgen et al., 1979). Participants were asked to respond by using a 5-point, Likert-type scale with response options ranging from 1 (strongly disagree) to 5 (strongly agree).

Items for the scale were primarily drawn and adapted from existing research on reactions and receptivity to feedback (Anseel et al., 2011; Nemeroff & Wexley, 1979; Russell & Goode, 1988; Ryan et al., 2000; Silverman & Wexley, 1984). Using Ilgen et al.'s (1979) framework to guide item selection, the item pool was narrowed down to target participants' perceptions of accuracy and perceived utility of the feedback. The remaining eight (8) items were comprised of four (4) items focused on each those general sub-facets of feedback receptivity.

MTurk Attention and Validity Checks. As a web-based approach to data collection, MTurk can present questions with regard to the quality of obtained data. Mason and Suri (2012) recommend taking steps to identify automated and inattentive participants. First, including a small collection of items with verifiable answers allows researchers to identify and discard data with nonsensical responses (see Appendix L). For example, including an item such as, "In an average week, I usually die between three and five times," within a list of items used for measurement allows the research to remove any participants who agree with the statement from all analyses. The participant can also be denied payment, if their response patterns are particularly suspect. The authors recommended that if denying payment is the intended resolution to incorrect responses to such questions, participants should be notified. For this study, such notification was included with survey instructions. Data were also examined for response patterns indicative of insincere responses. Unreasonably short completion times, duplicate cases, and inflexibility in survey responses are all suggestive of low-quality data, and were used to identify cases for removal from the dataset.

Manipulation checks. A number of items were administered to verify the effectiveness of experimental manipulations (see Appendix M). In particular, these items were included to assess participants' understanding of normative feedback information, perceptions of feedback

sign and specificity, task difficulty, and the extent to which participants considered feedback during subsequent task performance. Response formats varied from item to item, ranging from “Yes/No” options to open-ended response blanks.

Results

Data were collected from 536 total participants. Of those, 31 participants were excluded from the dataset as a result of failing to appropriately respond to items used for verifying attention to study elements. Additionally, seven participants were found to have completed the study twice; data collected during their second experience with the study were eliminated. After reviewing responses to scaled variables, two additional participants were identified as having displayed particularly suspicious response patterns (e.g., all neutral, all extreme) and were excluded from the dataset. Further analyses were conducted using a starting sample size of 496 participants. For a table of means, standard deviations, and intercorrelations for all continuous variables, see Table 1.

Confirmatory Factor Analyses

In advance of hypothesis testing, confirmatory factor analyses (CFAs) were conducted to verify the underlying structure of the instruments measuring goal orientation and receptivity to feedback. All CFAs were conducted in IBM’s SPSS AMOS 21.0 via structural equation modeling (SEM).

Goal orientation. Expectations regarding the underlying factor structure of the goal orientation instrument were based upon the findings of the scale’s authors and related research (Baranik et al., 2007; VandeWalle, 1997). Baranik et al. argued that their scale consisted of four conceptually-distinct, but related subtypes: performance-approach, performance-avoid, mastery-approach, and mastery-avoid. With the exception of the mastery-avoid subscale (6-items), each

was intended to be measured by four-item subscales. The initial structural model is depicted in Figure 5. Preliminary analyses were used to test assumptions underlying CFA using SEM. No multivariate outliers were identified, resulting in retention of all 498 participants. Significant deviation with regard to multivariate normality was detected, particularly with regard to multivariate kurtosis. As a result of the influence of multivariate kurtosis on the chi-square statistic (Byrne, 2010), Bollen-Stine bootstrapping was employed as an alternative to exclusive use of the chi-square statistic (Bollen & Stine, 1992).

The expected model was subsequently tested. Use of absolute metrics assessing the model's goodness-of-fit revealed significant differences between the expected model and the reality of the observed data, $\chi^2 = 359.32$, $df = 129$, $p < 0.001$; $\chi^2/df = 2.79$. Using 1,000 iterations, the Bollen-Stine bootstrap also indicated significant a significant difference between the expected model and the observed data ($p = 0.001$). Common model fit indices suggest that the expected model demonstrated adequate-to-strong fit, despite the above-mentioned significant deviation from the null hypothesis (CFI = 0.95; TLI = 0.94; RMSEA = 0.06). Examination of modification indices revealed evidence of cross-loaded items. One item, in particular, displayed potential cross-loadings with three of the four subscales ("I am often just trying to avoid performing poorly on tasks I encounter."). Removal of the item resulted in a significantly better-fitting model, $\Delta\chi^2 = 47.42$, $df = 16$, $p < 0.001$. Model fit indices were largely unchanged, continuing to indicate adequate-to-strong fit (CFI = 0.95, TLI = 0.94; RMSEA = 0.06). Further analyses based upon responses to the goal orientation instrument were conducted using the resulting 17-item scale (see Figure 6).

Receptivity to feedback. Expectations regarding the underlying factor structure of the feedback receptivity instrument were detailed earlier in this paper, on the basis of Ilgen et al.'s

(1979) model of reactions to performance feedback. The model tested by this CFA is a second-order model consisting of an overarching feedback receptivity factor (latent) influencing two first-order latent factors, each indicated by four items: feedback accuracy and feedback utility (see Figure 7). Assumptions underlying CFA using SEM were tested. No multivariate outliers were identified ($N = 496$). The data were revealed to be significantly kurtotic at the multivariate level, and Bollen-Stine bootstrapping was again used as a more robust test of the null hypothesis (Bollen & Stine, 1992).

The predicted model was tested, revealing a significant difference between the predicted model and the observed data, $\chi^2 = 147.25$, $df = 19$, $p < 0.001$; $\chi^2/df = 7.75$. After 1,000 iterations, the Bollen-Stine bootstrapping results similarly indicated a significant difference ($p = 0.001$). Model fit indices were examined, revealing mixed results that can be interpreted as poor overall fit ($CFI = 0.93$, $TLI = 0.90$, $RMSEA = 0.12$). Examination of the modification indices indicated one theoretically-viable adjustment – covariance among error terms for the following items: “I think that the feedback that I received was accurate,” and “I don’t think that the feedback that I received was a good assessment of my performance.” Given the conceptual overlap in the content domains of these items, correlation between the associated error terms is likely, regardless of sample characteristics. By allowing the error terms to covary, the model was significantly improved, $\Delta\chi^2 = 96.75$, $df = 1$, $p < 0.001$. The revised model demonstrated consistently strong fit across indices ($CFI = 0.98$, $TLI = 0.97$, $RMSEA = 0.06$). The revised model is depicted in Figure 8.

Manipulation Checks

To verify the efficacy of experimental manipulations, several manipulation check items were employed (see Appendix M). The first three such items inquired about the participants’

understanding of the feedback provided to them. When asked to briefly describe the feedback, 87.9 percent of the sample described the feedback in a manner that was consistent with the feedback provided. Two percent of the sample responded in manner that indicated suspicion of deception. Participants were then asked how their performance had compared to a hypothetical peer group; 93.9 percent of the sample described their relative performance in a manner consistent with their feedback. The third item prompted them to describe the meaning of a percentile rank, in order to confirm that participants understood the normatively-presented performance information. 86.7 percent of the sample demonstrated a basic understanding of the concept or better. In combination, participants' responses are indicative of their attention to and understanding of the feedback provided.

Two scaled items were included to assess the extent to that participants' perceptions of the feedback were consistent with their conditional assignments. When asked to rate the positivity/negativity of their feedback, 66.3 percent of the participants in the negative feedback conditions and 93.2 percent of the participants in the positive feedback conditions responded in a manner consistent with their conditional assignment (i.e., perceived as negative in negative conditions/perceived as positive in positive conditions). In the negative conditions, the bulk of the remaining participants responded "Neither Positive nor Negative" (20.7%). When asked to rate the specificity of their feedback, 85.5 percent of those in the specific feedback conditions responded in a manner consistent with their conditional assignment. Of those in the general conditions, however, only 16.3 percent responded "Very General" or "Somewhat General." Interestingly, despite the manipulation of feedback content, 73.7 percent of the sample assigned to receive general feedback rated that feedback as "Somewhat Specific" or "Very Specific."

Hypothesis Testing

To test Hypothesis 1, which predicted that receptivity to feedback would mediate the relationship between feedback and performance, Preacher and Hayes' (2008) "Process" macro for SPSS was utilized. The macro uses bootstrapping to calculate a confidence interval for direct and indirect mediation effects which avoids problematic assumptions underlying other techniques for testing mediation effects (e.g., Sobel, 1982). Using 1,000 bootstrap samples, it was revealed that the confidence intervals contained zero for all conditional indirect effects. A 95% confidence interval that contains zero can be interpreted as a non-significant mediation effect. Thus, Hypothesis 1 was not supported by the data.

Preliminary data analysis was conducted to test assumptions underlying the application of analysis of covariance (ANCOVA). Examination of cell frequencies revealed a pattern of unequal sample sizes stemming from a relative under-representation of participants uniquely espousing an avoid goal orientation in some cells (ten or fewer participants in five cells; cell-to-cell ratios greater than 5.0 for two cells). To avoid undue violation of the assumption of equal sample sizes, the distinction between approach and avoid orientations was excluded from the subsequent ANCOVA. Examination of the data revealed no cause for eliminating outlying data on the dependent variable (feedback receptivity). Tests of normality revealed consistent, significant deviations ($p < 0.01$). However, given the size of the sample and its associated influences on both test sensitivity and analysis robustness (Tabachnik & Fidell, 2007), further consideration for the absolute values of skewness and kurtosis was warranted. Despite a trend toward slight negative skew and slight leptokurtosis in feedback receptivity, absolute values for skewness and kurtosis were within acceptable ranges ($|x| < 1.0$). Accordingly, the data were considered to be relatively normally distributed.

Categorization of participants on the basis of their dominant achievement goal orientation resulted in a noteworthy reduction in the sample size used to conduct the ANCOVA. Dominant goal orientations were determined through computation of mean scores for each dimension of the goal orientation scale, and identification of the dimension with the highest average score. Participants for whom multiple dimensions were equally high were considered missing data in the creation of the associated categories ($n = 74$). The resulting sample consisted of 422 participants. Exclusion of such a substantial proportion of the sample carries negative consequences with regard to the test's statistical power. Given the associated exclusion of the approach-avoid distinction (and its interactions with other variables), however, the remaining sample was of sufficient size to allow for acceptable statistical power ($1 - \beta > 0.80$) for detecting small to moderate effects ($\eta_p^2 = 0.05$).

To formally test Hypotheses 2 through 6, a between-subjects, factorial ANCOVA was conducted using PASW Statistics 18 (SPSS). The dependent variable of interest was an overall composition of receptivity to feedback. The following four dichotomous variables were included as fixed factors in the analysis: feedback sign (positive/negative), feedback specificity (general/specific), goal orientation (performance/mastery), and task type (numerical/verbal). Additionally, performance on the first iteration of the task was included as a covariate to control for its potential influence on the dependent measure (see Table 2).

Hypothesis 2, which predicted that positive feedback would be accompanied by greater receptivity to feedback than would negative feedback, was tested by the main effect of feedback sign on receptivity to feedback. The analysis revealed no significant main effect of feedback sign on receptivity, $F(1,405) = 0.26, p = 0.611$. Participants receiving positive feedback ($M = 3.56, SD = 0.78$) did not report significantly different receptivity to the feedback they received

than did participants receiving negative feedback ($M = 3.53$, $SD = 0.81$). Thus, Hypothesis 2 was not supported by the data in this study.

Though no specific hypothesis was planned for the comparison between numerical and verbal tasks for this study, the analysis did reveal a significant interaction effect between feedback sign and task type, $F(1,405) = 5.79$, $p = 0.017$. The interaction was disordinal in nature, with participants assigned to the numerical task displaying greater receptivity to negative feedback and participants assigned to the verbal task displaying greater receptivity to positive feedback (see Figure 9). Analysis of simple effects revealed that, for participants performing the mathematical task, the effect of feedback sign on receptivity to feedback was non-significant, $F(1, 405) = 1.88$, $p > 0.05$. For participants performing the verbal task, however, participants receiving positive feedback were significantly more receptive than were participants receiving negative feedback, $F(1,405) = 5.09$, $p < 0.05$.

Hypothesis 3, which predicted that more specific feedback would prompt greater receptivity to feedback than would general feedback, was tested by the main effect of feedback specificity on receptivity to feedback. The analysis revealed the effect to be significant, $F(1,405) = 6.44$, $p = 0.012$. Provision of specific feedback ($M = 3.69$, $SD = 0.78$) was associated with significantly greater feedback receptivity than was provision of general feedback ($M = 3.39$, $SD = 0.78$). Thus, Hypothesis 3 was supported by the data in this study.

Hypothesis 4, which predicted an interaction between feedback sign and feedback specificity on receptivity to feedback, was tested by the interaction effect between the two variables. The analysis revealed no significant interaction effect, $F(1,405) = 2.03$, $p = 0.155$. Inspection of cell means further revealed the pattern of means to be inconsistent with predictions.

Specific feedback was slightly preferred to general feedback for both positive and negative feedback conditions. Thus, Hypothesis 4 was not supported by the data in this study.

Hypothesis 5, which predicted an interaction between goal orientation (performance/mastery) and feedback sign on receptivity to feedback, was tested by the associated interaction effect. The interaction was revealed to be non-significant, $F(1,405) = 0.37, p = 0.542$. Contrary to predictions, performance- and mastery-oriented participants were not differentially receptive to positive and negative feedback. Thus, Hypothesis 5 was not supported by the data in this study.

Hypothesis 6, which predicted an interaction between goal orientation (performance/mastery), feedback sign, and feedback specificity on receptivity to feedback, was tested by the associated 3-way interaction effect. Data analysis revealed the interaction to be significant, $F(1,405) = 4.42, p = 0.036$. Simple effects were used to probe the interaction to examine to extent to which the data were consistent with predictions. The analysis revealed that, for mastery-oriented participants, the 2-way interaction between feedback sign and feedback specificity was not significant, $F(1,405) = 0.35, p > 0.05$. For performance-oriented participants, however, the 2-way interaction between feedback sign and feedback specificity was found to be significant, $F(1,405) = 4.30, p < 0.05$. Examination of cell means revealed the interaction to be disordinal. See Figure 10 for depictions of the above-described interaction effects. The pattern of cell means was revealed to be consistent with predictions, such that, for performance-oriented participants, specific positive feedback was associated with the greatest receptivity to feedback, while specific negative feedback was associated with the least receptivity to feedback. Thus, Hypothesis 6 was supported by the data.

Exploratory Analyses

Approach/avoid distinction (2 x 2). In order to explore the distinction between approach- and avoid-orientations on receptivity to feedback, a series of hierarchical multiple regression analyses were conducted using receptivity to feedback as the criterion. Four such analyses were conducted – one for each type of goal orientation. For each of the analyses, performance on the initial trial of the experimental task was entered as a control variable in Step 1. Feedback sign, feedback specificity, and goal orientation were added to the model in Step 2 as predictors. In Step 3, multiplicative terms for all 2-way interactions were entered into the model. The term carrying the 3-way interaction between all predictors was entered in Step 4. Coefficients for each of these models are presented side-by-side for comparison in Table 3.

Consistent with the previously-conducted ANCOVA, the relationship between feedback specificity and receptivity to feedback was significant and positive in all four regression analyses ($0.16 < \beta < 0.18, p < 0.001$). The analysis also revealed significant positive relationships between receptivity to feedback and the following types of goal orientation: performance-approach ($\beta = 0.20, t = 4.55, p < 0.001$), mastery-approach ($\beta = 0.22, t = 5.09, p < 0.001$), and mastery-avoidance ($\beta = 0.12, t = 2.61, p = 0.009$). The interaction between mastery-approach goal orientation and feedback specificity was also revealed to be significant, $\beta = 0.09, t = 1.97, p = 0.050$. Simple slopes analysis was used to probe the interaction, which was revealed to be ordinal in nature (see Figure 11). The relationship between mastery-approach goal orientation and receptivity to feedback was more strongly positive for those participants receiving specific feedback ($\beta = 0.32, t = 5.08, p < 0.001$) than for participants receiving general feedback ($\beta = 0.14, t = 2.36, p = 0.018$). All remaining regression weights were found to be non-significant ($p > 0.05$).

Perceptions of feedback. With consideration for the inconsistencies between conditional manipulations and participants' self-reported perceptions of their feedback, an exploratory hierarchical regression analysis (see Table 4) was conducted for comparison with the ANCOVA results used for hypothesis testing. Performance during the first task trial was entered as a covariate in Step 1. Goal orientation (dichotomous – performance/mastery), perception of feedback positivity, and perception of feedback specificity were added to the model as predictors in Step 2. In Step 3, all multiplicative terms carrying the 2-way interactions between predictors were entered. The term carrying the 3-way interaction was entered in Step 4.

Consistent with both the ANCOVA and regression results obtained for manipulated feedback specificity, perceptions of specificity were significantly, positively related to feedback receptivity, $\beta = 0.34, t = 7.39, p < 0.001$. The magnitude of the relationship, however, was stronger for perceptions of specificity than for conditional assignment. In contrast to the results of the ANCOVA, this analysis revealed no significant interaction between perceptions of positivity (feedback sign), perceptions of specificity, and goal orientation (performance/mastery), $\beta = 0.12, t = 1.29, p = 0.196$. Additionally, this analysis revealed a significant relationship between perceived feedback sign and receptivity to feedback, $\beta = 0.12, t = 2.55, p = 0.011$. Participants perceiving the feedback as more positive were also more receptive. No other regression weights were found to be significant ($p > 0.05$).

Multivariate effects. In order to gain a more thorough understanding of the effects of feedback sign, feedback specificity, and goal orientation on receptivity to feedback, an exploratory MANCOVA was conducted. The two subfacets of the feedback receptivity instrument (perceived accuracy and perceived utility) were treated as dependent variables. As in the initial ANCOVA, feedback sign, feedback specificity, assigned task type, and dichotomized

goal orientation (performance/mastery) were entered as fixed factors, and performance on the initial trial was entered as a covariate (see Table 5).

The analysis revealed two significant multivariate effects. A significant multivariate main effect was found for feedback specificity, $\lambda = 0.97$, $F(2,404) = 6.57$, $p = 0.002$. To interpret the multivariate main effect, the univariate main effect of specificity on each subfacet of the receptivity instrument was examined. At the univariate level, feedback specificity had a significant main effect on perceived feedback utility ($F(1,405) = 11.77$, $p = 0.001$), but not on perceived feedback accuracy ($F(1,405) = 1.13$, $p = 0.288$). Participants receiving specific feedback ($M = 3.64$, $SD = 0.88$) were more receptive with regard to perceived utility than were those who received general feedback ($M = 3.21$, $SD = 0.88$). The multivariate interaction effect between feedback sign and task assignment was also revealed to be significant, $\lambda = 0.96$, $F(2,404) = 8.15$, $p < 0.001$. At the univariate level, the interaction was significant for perceptions of accuracy ($F(1,405) = 13.17$, $p < 0.001$), but not for perceptions of utility ($F(1,405) = 0.48$, $p = 0.487$). Simple effects analysis was used to probe the significant, disordinal interaction for perceptions of accuracy. For the numerical task, participants who received negative feedback reported perceiving that feedback as more accurate ($M = 3.81$, $SD = 0.83$) than did their counterparts who received positive feedback ($M = 3.52$, $SD = 0.90$), $F(1,405) = 4.15$, $p < 0.05$. For the verbal task, however, participants who received negative feedback reported perceiving the feedback as less accurate ($M = 3.44$, $SD = 0.88$) than did their counterparts who received positive feedback ($M = 3.86$, $SD = 0.83$), $F(1,405) = 11.01$, $p < 0.001$.

Excluded Participants (Disbelief/Lack of Understanding). In order to ensure that participants who did not sufficiently understand or buy in to the feedback content did not unduly influence the data analysis, an exploratory ANCOVA was conducted using a sample from which

such participants were excluded. With the exception of the excluded participants, the analysis was identical to the previously-described ANCOVA used for formal hypothesis testing.

The ANCOVA revealed one substantive deviation from the original analysis. Just as in the previous ANCOVA, greater feedback specificity was associated with higher levels of self-reported receptivity to feedback ($F(1,389) = 9.62, p = 0.002$), indicating that participants assigned to receive more specific feedback ($M = 3.73, SD = 0.72$) were more receptive to feedback than were those assigned to receive general feedback ($M = 3.44, SD = 0.71$). Further, the interaction between feedback sign and task type on feedback receptivity was again found to be significant, $F(1,389) = 5.59, p = 0.018$. The disordinal interaction between the variables was very similar to the associated effect found using the inclusive sample (i.e., greater receptivity to negative feedback for numerical task, and greater receptivity to positive feedback for the verbal task). For the three-way interaction between feedback sign, feedback specificity, and goal orientation (performance/mastery) on receptivity to feedback, however, this analysis revealed no significant interaction effect, $F(1,389) = 1.55, p = 0.213$. Comparisons between those participants who were excluded to those who were retained revealed a substantial mean difference in feedback receptivity. Specifically, excluded participants ($M = 1.89, SD = 0.94$) reported less receptivity than did retained participants ($M = 3.60, SD = 0.74$). Further, although the excluded participants were fairly evenly distributed across manipulated conditions, there was an over-representation of mastery-oriented participants, influencing the nature of the interaction effect.

Discussion

Performance feedback simultaneously represents one of the most widely-integrated and least consistent mechanisms in the field of industrial/organizational psychology. The purpose of

this study was to investigate the combined influence of feedback sign, feedback specificity, and goal orientation on receptivity to feedback in an effort to better understand moderating influences on feedback and to guide practical improvements for feedback interventions.

Drawing in large part from Ilgen et al. (1979) and Kluger and DeNisi's (1996) FIT, several hypotheses were derived to better understand how feedback and personal characteristics interact. The results described above and discussed below are suggestive of several opportunities for practical implementation, indicative of some limitations, and offer encouraging direction for further research.

Ilgen et al.'s (1979) model established reactions to feedback as important components in the relationship between performance feedback and subsequent performance. In particular, the authors proposed that four sequentially mediating variables intervene between receipt of feedback information and behavioral adjustment for future instances of performance: feedback perception, feedback acceptance, desire to respond to feedback, and selection of an intended response. Though parts of the model have been examined individually (e.g., Stone & Stone, 1985), only one empirical study has simultaneously tested the model in its entirety. Kinicki et al. (2004) found support for the series of mediators using a sample comprised of loan officers. With consideration for the obstacles inherent in the practical application of a model with multiple sequential mediators, the mediators from Ilgen et al.'s study were compiled into a single scale for this study. Accordingly, Hypothesis 1 predicted that the composite measure of reactions to feedback would similarly mediate the effect of performance feedback, and its characteristics, on subsequent performance. The hypothesis was not supported, however.

Lack of support for Hypothesis 1 could be suggestive of several possible conclusions. The absence of a significant mediation effect may be a product of condensing all four of Ilgen et

al.'s (1979) mediators into a single measure. Combining the variables may have diluted the unique mediating capacity of each element of the sequence. Given the conceptual progression between the variables, however, such an explanation seems unlikely. The logic behind the authors' model is that an individual must develop some perception of the feedback provided, followed by an evaluation of the feedback as accurate or inaccurate. If the feedback is considered to be accurate, it is sequentially filtered by one's desire to act on the information received and subsequent formation of goal-related intentions. Though a scaled composite does indeed collapse the individual steps into a single variable, the above-described cognitive progression should remain intact. For example, according to Ilgen et al.'s model, if an individual received and attended to feedback information, but evaluated that information as inaccurate, their desire to respond and likelihood to develop intentions to adjust behavior would be correspondingly low. As a result, the individual's performance would likely remain unchanged (or worsen). Consider the probable response pattern of the same individual on the feedback receptivity instrument. Disagreement with the item, "I think that the feedback I received was accurate," would likely accompany further disagreement with both, "I think that the feedback I received will help me do better next time," and, "After seeing my feedback, I have some ideas about how to improve."

One alternative explanation for Hypothesis 1's lack of support stands out as particularly plausible: the fabricated nature of the feedback. In retrospect, though it was expected that greater feedback specificity would foster heightened receptivity, and in turn, improved performance, the provision of formulaic feedback with no basis in the participants' actual task performance likely undermined Ilgen et al.'s (1979) model. Regardless of participants' receptivity to the feedback, the information contained therein was sufficiently generic as to offer

limited guidance for effective changes in task behavior. Though increased receptivity to feedback may have promoted increased motivation to engage in the task for the second trial, the short performance duration would have limited its influence, as well. In essence, the nature of the experimental manipulations themselves stands as the most likely source of non-support.

Hypothesis 2 predicted that the relative positivity or negativity of feedback provided to participants would influence their receptivity to the feedback. Previous research has consistently shown that positive feedback is perceived as more accurate, prompts more positive affective responses, and promotes attention to task-relevant information (Stone & Stone, 1985; Anseel & Leivens, 2006; Atwater & Brett, 2005; Butler, 1987). FIT suggests that receipt of negative feedback prompts negative affect and redirects focus toward oneself, which in turn reduces attentional resources dedicated to task performance (Kluger & DeNisi, 1996). Despite the consistency of the existing literature and a theoretical basis, Hypothesis 2 was not supported. There was no observed difference on the basis of feedback sign. Three explanations for the null effect stand out as plausible.

First, participants in this study had no ongoing, vested interest in success for the experimental task. Though each participant was paid, payment was not contingent on performance, nor were there any reasons to expect further opportunities for reward in the future. The absence of consequences, positive or negative, for attending to the feedback may have reduced the effectiveness of the feedback sign manipulation. Second, the impersonal nature inherent in the online administration of this study may also have suppressed the effect of feedback sign. By providing performance information to an individual via what seemed to be an automated feedback system, in an environment that encourages a sense of anonymity, the likelihood of activating participants' evaluation apprehension was minimized (Carver & Scheier,

1981b). In other words, the primary mechanism through which feedback sign most readily influences affective responses was effectively absent. Last, examination of the manipulation check items revealed that participants' perceptions of the feedback provided were not always consistent with conditional manipulations. In particular, approximately 15 percent of participants assigned to the negative feedback condition interpreted that feedback as being "Somewhat Positive" or "Very Positive," despite the majority of participants demonstrating some degree of understanding for the meaning of their percentile ranking. Such inconsistency in perceptions within assigned groups is likely to increase error variance, reducing the effect of the categorical variable. In investigating the role of participants' perceptions of feedback sign, a weak, positive relationship was found with feedback receptivity, a finding that is consistent with previously published studies (see Kluger & DeNisi, 1996 for meta-analytical results).

Considered in combination with the non-significant effect of the sign manipulation, it is reasonable to conclude that the manipulation for feedback sign was ineffective in the online environment. Further, it may be prudent to design future studies targeting feedback sign to incorporate perceptions of feedback.

The significant interaction between feedback sign and task assignment on feedback receptivity is suggestive of perceived task difficulty being a potential moderator of feedback sign effects. For the verbal task, perceived as having low-to-moderate difficulty, feedback sign effects were in-line with expectations derived from existing literature (e.g., Stone & Stone, 1985). For the numerical task, which participants perceived to be moderate-to-high difficulty, the feedback sign effect was directly contrary to previous research (i.e., more receptive to negative feedback). Results from the MANCOVA indicated that responses to the perceived accuracy subscale of the feedback receptivity instrument were driving the interaction effect. In

essence, participants in the easier of the two tasks perceived positive feedback as more accurate, while participants in the more difficult task perceived negative feedback as more accurate.

Hypothesis 3 predicted that greater feedback specificity would result in greater receptivity to the associated feedback. The data were supportive of the hypothesis, providing evidence that builds on existing literature (Baron, 1988; Goldstein et al., 1968). Greater receptivity in response to more specific feedback is consistent with the notion that task-oriented detail promotes a greater sense of understanding, which in turn, encourages future-directed intention formation (Kluger & DeNisi, 1996). The exploratory MANCOVA provided further confirmation that participants in the high specificity condition perceived greater utility in the feedback, with regard to future trials. As was the case with feedback sign, the specificity manipulation check revealed some minor deviations with regard to participants' perception of their conditionally-assigned feedback. However, the results of the exploratory analysis substituting perceptions of specificity for manipulated specificity were consistent with the original conclusion; greater specificity was associated with greater receptivity.

Hypothesis 4 predicted that feedback sign and feedback specificity would interact with one another to influence receptivity to feedback. Derived primarily from FIT (Kluger & DeNisi, 1996), it was expected that, for negative feedback, high specificity would increase the likelihood of a negative affective responses relative to low specificity, and as a result, discourage feedback receptivity. For positive feedback, however, it was expected that greater specificity would better inform upward goal revision, increasing receptivity. The data did not support the hypothesis. As previously discussed, the combination of an impersonal experimental environment and wide-ranging perceptions of the sign manipulation likely had an impact on the role of feedback sign in this interaction. In particular, it is unclear whether or not the manipulation elicited negative

affective responses. The 2-way interaction tested for Hypothesis 4 was also qualified by the 3-way interaction tested for Hypothesis 6.

Hypothesis 5 predicted an interaction between feedback sign and goal orientation. Drawing on existing models of the feedback process (Ilgen et al., 1979; Kluger & DeNisi, 1996; Taylor et al., 1984), it was expected that goal orientation would surface as a valuable individual difference variable in understanding reactions to and consequences of feedback. More specifically, given performance-oriented participants' preference for ego-maintenance and ego-enhancement (Dweck, 1986; Dweck & Leggett, 1988), they were expected to prefer positive feedback to negative feedback. Mastery-oriented participants, however, were expected to display greater resilience in the face of negative performance information, given its potential to improve their competence. The interaction, however, was found to be non-significant. Previously discussed concerns with the feedback sign manipulation are similarly relevant to the discussion of Hypothesis 5. As was the case for Hypothesis 4, however, the interaction predicted for Hypothesis 5 was qualified by the 3-way interaction predicted in Hypothesis 6.

Hypothesis 6 predicted that feedback sign, feedback specificity, and goal orientation (dichotomized as performance/mastery) would interact to influence receptivity to feedback. The hypothesis drew from theory underlying feedback processes (e.g., Ilgen et al., 1979; Kluger & DeNisi, 1996) and achievement goal theory (Dweck, 1986; Dweck & Leggett, 1988; Nichols, 1984) to explore the interplay between feedback characteristics and personal characteristics. Because negative feedback threatens one's ego, and specificity augments the threat by preventing externalization, it was predicted that performance-oriented individuals would be especially susceptible to specific negative feedback. On the other hand, the ego-enhancing qualities of positive feedback were expected to be similarly augmented by specificity for

performance-oriented participants. For mastery-oriented participants, it was expected that a relative preference for achieving competence would reduce the influence of feedback's positivity or negativity. Instead, it was predicted that greater specificity would result in greater receptivity, regardless of its sign. Hypothesis 6 was supported by the data.

The significant interaction between feedback sign, feedback specificity, and goal orientation confirms that both feedback and personal characteristics play key roles how we react to performance feedback. Though Ilgen et al.'s (1979) model of reactions to feedback and FIT (Kluger & DeNisi, 1996) both include catch-all references to personal characteristics, the findings of this research help to clarify the unique impact that goal orientation carries in influencing the feedback process. Achievement goal orientation seems to be particularly informative with regard to the efficacy of FIT. As a moderator of one's receptivity to different feedback characteristics, goal orientation can help to predict whether an individual will redirect attentional resources toward task learning processes or meta-task processes after receiving various configurations of performance information. The absence of a significant interaction between these variables when skeptics and those who did not demonstrate understanding of the feedback provided were excluded from the analysis raises questions about the stability of the interaction. Additional research on the effect is needed to test its consistency.

The individual exploratory analyses for each type of goal orientation contained three findings of interest. First, the positive relationship between specificity and receptivity was confirmed in each of the four analyses. Second, a significant, positive relationship was found between goal orientation and receptivity for three of the four orientations: performance-approach, mastery-approach, and mastery-avoid. Affiliation with a performance-avoid orientation displayed a non-significant, negative relationship with receptivity to feedback.

Considering the underlying motives for each orientation (Dweck & Leggett, 1988; Elliot, 2005), the results make logical sense (moderating influences notwithstanding). An individual displaying a performance-approach orientation is motivated to demonstrate success, and as such, should generally be somewhat receptive to feedback that will allow them to do so. Similarly, mastery-approach- and mastery-avoid-oriented individuals are motivated to enhance competence, and should generally be receptive to information that enables that goal. Individuals with performance-avoid orientations, however, have no particular motivation toward improving performance, so long as they do not feel threatened by evaluation. Given the aforementioned concerns regarding evaluation apprehension in this study, there simply may not have been sufficiently motivating circumstances to prompt receptivity. And third, the interaction between specificity and mastery-approach goal orientation confirms that, though mastery-approach-oriented individuals are relatively receptive to feedback in a general sense, when specificity is high, those individuals are particularly receptive.

Practical Implications

Perhaps the most valuable contribution of this research lies in its potential for improving the practical implementation of effective feedback interventions. Though not a novel idea, the data confirm that, in general, increasing specificity improves subsequent reactions to feedback. At a time when the overarching opinion of performance appraisals is resoundingly negative (CEB Corporate Leadership Council, 2012), increasing specificity, even in relatively minor ways, serves as a simple step to increase organizational effectiveness.

The data also suggest that assessing employees' (or students') goal orientation may allow for effectively catering feedback to facilitate greater receptivity, and in turn, greater likelihood of feedback-consistent behavioral changes. For example, if an employee is identified as having a

performance goal orientation, their supervisor can increase feedback specificity when presenting positive performance elements and reduce specificity when presenting negative performance elements. Doing so allows the supervisor to address performance deficiencies while minimizing threats to the employee's ego, reducing the risk of the employee refocusing attention from the task to the self. Similarly, for mastery-oriented employees, supervisors can be trained to maximize task-relevant detail to foster more positive outcomes. Though this study focused on the role of dispositional goal orientation on receptivity to feedback, there is some evidence that goal orientation can be induced through situational management (Steele-Johnson, Heintz, & Miller, 2008). To the extent that a supervisor wishes to provide feedback with certain characteristics (e.g., specific/negative, general/positive), these results are suggestive of value in taking steps to induce state goal orientation.

One unexpected implication of these findings lies in the null effect of feedback sign on receptivity to feedback. Given the consistency of previous research with regard to the influence of negative feedback on subsequent reactions and performance, the absence of a significant difference between positive and negative feedback conditions in this study is suggestive of a potential opportunity to minimize the undesirable effects of negative feedback. By taking steps to reduce evaluation apprehension and limiting the immediate consequences of suboptimal task performance, it may be possible to offset resultant negative affect and task disengagement. Further research on the effectiveness of such techniques is likely warranted.

Strengths, Limitations, and Directions for Future Research

The use of an online environment to collect data likely constitutes a limitation of this study. Though there is sufficient evidence to support the use of MTurk (e.g., Buhrmester et al., 2011; Paolacci et al., 2010), and other similar online data collection platforms, the results of this

study suggest that certain types of experimental manipulations are more effective in environments with greater social interaction. In this case, the salience of the feedback sign manipulation was likely undermined by the absence of social facilitation effects. Replicating the study using a traditional face-to-face data collection strategy would seem to be a fruitful extension. Collecting data in person introduces the aspects of social facilitation that were missing from the current study, and accordingly, can be expected to strengthen the feedback sign manipulation. Examination of these effects using an applied sample is also warranted.

The absence of meaningful consequences is an issue that consistently plagues the generalization of academic research in the field of industrial/organizational psychology. In the area of performance feedback, specifically, both positive and negative feedback can have long-lasting ramifications for one's career path and income trajectory. Positive feedback facilitates pay raises, bonuses, promotions, and job mobility. Negative feedback frequently inhibits access to such opportunities, and often carries a very real possibility of job loss. Simulating the magnitude of such consequences in experimental settings is virtually impossible. However, offering inducements for high performance may be sufficient to add meaning to task behavior, while retaining a relatively high degree of control over conditional manipulations.

Use of fabricated feedback, while not atypical in experimental investigations of performance feedback, does stand as a potential limitation of this study. First and foremost, fabricated feedback inevitably carries a risk of the recipient interpreting the feedback as inaccurate. Manipulation checks revealed few overtly suspicious participants (~ 2%), though others who did not openly express their suspicion may have been present. Examination of the grand mean for the accuracy dimension of the receptivity scale suggests that participants generally perceived the feedback to be accurate to some degree ($M = 3.67$). Conceptually, the

use of fabricated feedback in this study also introduced an obstacle for Hypothesis 1. While Ilgen et al.'s (1979) model posits that reactions to feedback mediate the effect of feedback on performance, it assumes that the feedback is constructive with regard to subsequent performance. By using feedback that had no basis in participants' actual initial performance, effects on performance would have been almost entirely a function of changes in motivation, rather than accommodation of instructive new information. Further research in this area would offer more generalizable conclusions by using legitimate, constructive feedback.

Despite its limitations, this study's primary strength lies in its uniqueness. A thorough literature review revealed no other studies that have simultaneously examined the effects of feedback sign, feedback specificity, and goal orientation on reactions to feedback. Accordingly, this study was uniquely equipped to explore the combined effects of all three variables of interest on individuals' receptivity to the feedback provided to them. In so doing, it was revealed that those combined effects offer valuable insight into how people respond after receiving feedback. Though the magnitudes of the effects found in this study were relatively small, it seems reasonable to consider the observed effect sizes as fairly minimal estimates of the effects that would manifest in applied settings given the limitations discussed above.

Two other areas would seem to offer promising avenues for further inquiry: perceptions of feedback characteristics and validation of the receptivity to feedback instrument. Differences between the intent of conditional manipulations and participants' perceptions of those manipulations are indicative of an opportunity for making quasi-experimental approaches to researching this topic viable. Because small differences in the statistical conclusions drawn from conditionally-assigned feedback and perceptions of that feedback were found, further research verifying the validity of these types of perceptions may be appropriate. With regard to the

feedback receptivity scale, though the psychometric properties of the scale are in order, further validation is needed to provide construct validity evidence.

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Table 1

Means, Standard Deviations, and Intercorrelations for All Continuous Variables (N = 496).

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12
1. Performance-approach GO	4.83	1.23	(0.82)											
2. Performance-avoid GO	3.76	1.41	0.32**	(0.87)										
3. Mastery-approach GO	5.51	1.03	0.30**	-0.43**	(0.87)									
4. Mastery-avoid GO	4.41	1.39	0.37**	0.64**	-0.17**	(0.84)								
5. Perceived FB Sign	3.33	1.38	-0.04	-0.11*	0.01	-0.07	---							
6. Perceived FB Specificity	4.02	1.05	-0.03	-0.06	0.11*	-0.02	0.31**	---						
7. FB Accuracy Perceptions	3.67	0.87	0.14	-0.01	0.14**	0.10*	0.20**	0.35**	(0.84)					
8. FB Utility Perceptions	3.46	0.91	0.20	-0.03	0.27**	0.09*	0.15**	0.30**	0.60**	(0.84)				
9. Overall FB Receptivity	3.56	0.79	0.19	-0.02	0.23**	0.10*	0.20**	0.36**	0.89**	0.90**	(0.88)			
10. Perceived Task Difficulty	5.28	1.45	0.07	0.00	0.05	0.05	0.03	0.11*	0.04	0.08	0.07	---		
11. Task 1 Performance	10.22	6.75	0.04	0.09*	-0.12**	0.01	-0.04	-0.13*	-0.06	-0.06	-0.07	-0.24**	---	
12. Task 2 Performance	13.55	6.89	0.12	0.11*	-0.09	0.03	-0.07	-0.08	-0.07	-0.09*	-0.09*	-0.22**	0.71**	---

Note. Coefficient alphas are presented in parentheses along the diagonal. * $p < 0.05$, ** $p < 0.01$.

Table 2

An Analysis of Covariance for the Effects of Feedback Sign, Feedback Specificity, Goal Orientation (P/M), and Task Assignment on Feedback Receptivity.

Source	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	η_p^2
T1 Performance	1	0.40	0.67	0.415	0.002
Feedback Sign	1	0.16	0.26	0.611	0.001
Feedback Specificity	1	3.86	6.44	0.012	0.016
Task Assignment	1	0.02	0.04	0.845	0.000
Goal Orientation (P/M)	1	0.01	0.02	0.882	0.000
FBSign x FBSpecificity	1	1.22	2.03	0.155	0.005
FBSign x TaskAssign	1	3.47	5.79	0.017	0.014
FBSign x GO(P/M)	1	0.22	0.37	0.542	0.001
FBSpecificity x TaskAssign	1	0.25	0.42	0.517	0.001
FBSpecificity x GO(P/M)	1	3.28	5.47	0.020	0.013
TaskAssign x GO(P/M)	1	0.64	1.07	0.301	0.003
FBSign x FBSpecificity x TaskAssign	1	0.04	0.07	0.788	0.000
FBSign x FBSpecificity x GO(P/M)	1	2.65	4.42	0.036	0.011
FBSign x TaskAssign x GO(P/M)	1	0.11	0.18	0.674	0.000
FBSpecificity x TaskAssign x GO(P/M)	1	0.01	0.02	0.892	0.000
FBSign x FBSpec x TaskAssign x GO(P/M)	1	0.14	0.24	0.625	0.001
Error	405	0.60			
Total	421				

Table 3

Coefficients for Hierarchical Regressions Exploring Goal Orientations (N = 496).

Variable Entered	Performance-Approach		Performance-Avoid		Mastery-Approach		Mastery-Avoid	
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1		0.01		0.01		0.01		0.01
T1 Performance	-0.07		-0.07		-0.07		-0.07	
Step 2		0.07***		0.03**		0.08***		0.04***
Feedback Sign	0.03		0.03		0.03		0.03	
Feedback Specificity	0.18***		0.17***		0.16***		0.17***	
Goal Orientation	0.20***		0.00		0.22***		0.12**	
Step 3		0.01		0.01		0.01		0.00
FBSign x FBSpecificity	0.00		0.01		0.01		0.01	
FBSign x GO	0.07		0.03		-0.02		0.04	
FBSpecificity x GO	-0.04		-0.08		0.09*		-0.04	
Step 4		0.00		0.00		0.00		0.00
FBSign x FBSpecificity x GO	0.06		0.06		0.04		0.02	

p < .01. *p < .001.

Table 4

Exploratory Hierarchical Regression Analysis Using Perceptions of Feedback (N = 496).

Variable Entered	ΔR^2	F	β
Step 1	0.003	1.11	
T1 Performance			-0.05
Step 2	0.132	21.07***	
Feedback Sign (Perception)			0.12*
Feedback Specificity (Perception)			0.32***
Goal Orientation (P/M)			-0.02
Step 3	0.006	0.99	
FBSign(P) x FBSpecificity(P)			-0.07
FBSign(P) x GO(P/M)			0.01
FBSpecificity(P) x GO(P/M)			-0.06
Step 4	0.002	1.14	
FBSign(P) x FBSpec(P) x GO(P/M)			0.12

* $p < .05$. *** $p < .001$.

Table 5

Exploratory Multivariate Analysis of Covariance of the Effects of Variables on Perceived Feedback Accuracy and Perceived Feedback Utility.

Source	λ	df	MS	F	η_p^2
T1 Performance	0.997	2		0.53	0.003
Feedback Sign	0.999	2		0.26	0.001
Feedback Specificity	0.969	2		6.57	0.031
Accuracy Perceptions		1	0.83	1.13	0.003
Utility Perceptions		1	9.10	11.77	0.028
Task Assignment	0.997	2		0.59	0.003
Goal Orientation (P/M)	0.999	2		0.14	0.001
FBSign x FBSpecificity	0.992	2		1.55	0.008
FBSign x TaskAssign	0.961	2		8.15	0.039
Accuracy Perceptions		1	9.69	13.17	0.031
Utility Perceptions		1	0.37	0.48	0.001
FBSign x GO(P/M)	0.999	2		0.19	0.001
FBSpecificity x TaskAssign	0.997	2		0.51	0.003
FBSpecificity x GO(P/M)	0.986	2		2.85	0.014
TaskAssign x GO(P/M)	0.997	2		0.65	0.003
FBSign x FBSpecificity x TaskAssign	1.000	2		0.04	0.000
FBSign x FBSpecificity x GO(P/M)	0.988	2		2.37	0.012
FBSign x TaskAssign x GO(P/M)	0.999	2		0.26	0.001
FBSpecificity x TaskAssign x GO(P/M)	0.995	2		1.02	0.005
FBSign x FBSpec x TaskAssign x GO(P/M)	0.999	2		0.13	0.001
Error		404			
Accuracy Perceptions		405	0.74		
Utility Perceptions		405	0.77		

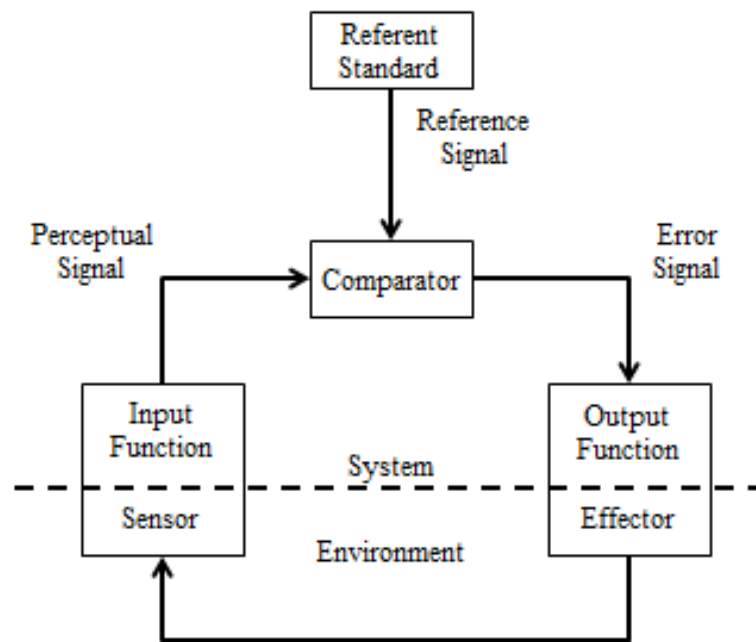


Figure 1: A simple, discrepancy-reduction feedback loop (recreated from Klein, 1989).

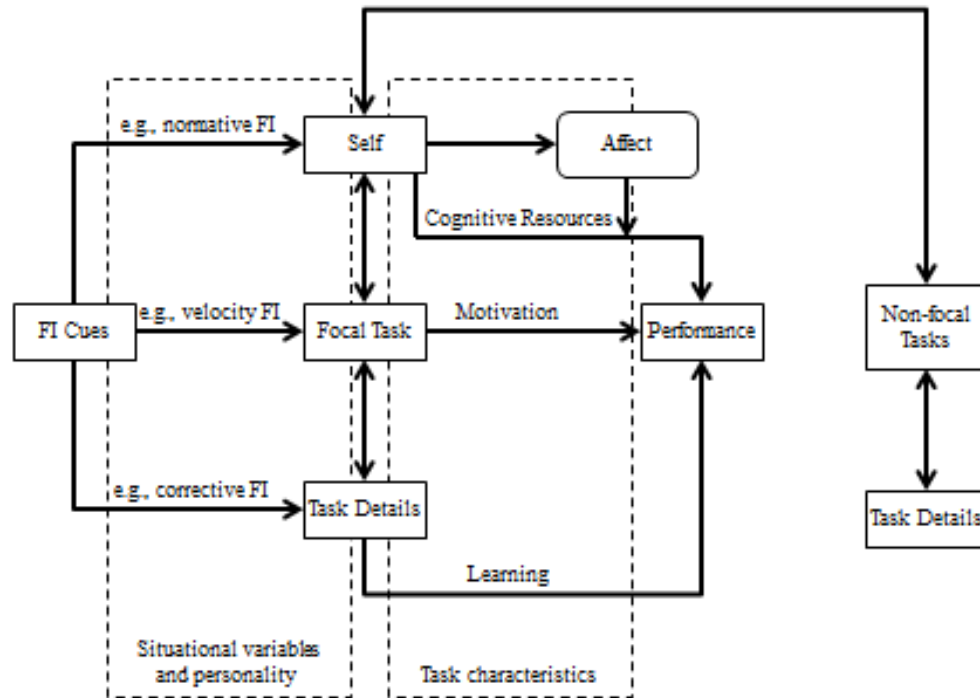


Figure 2: An overview of feedback intervention theory (recreated from Kluger & DeNisi, 1996).

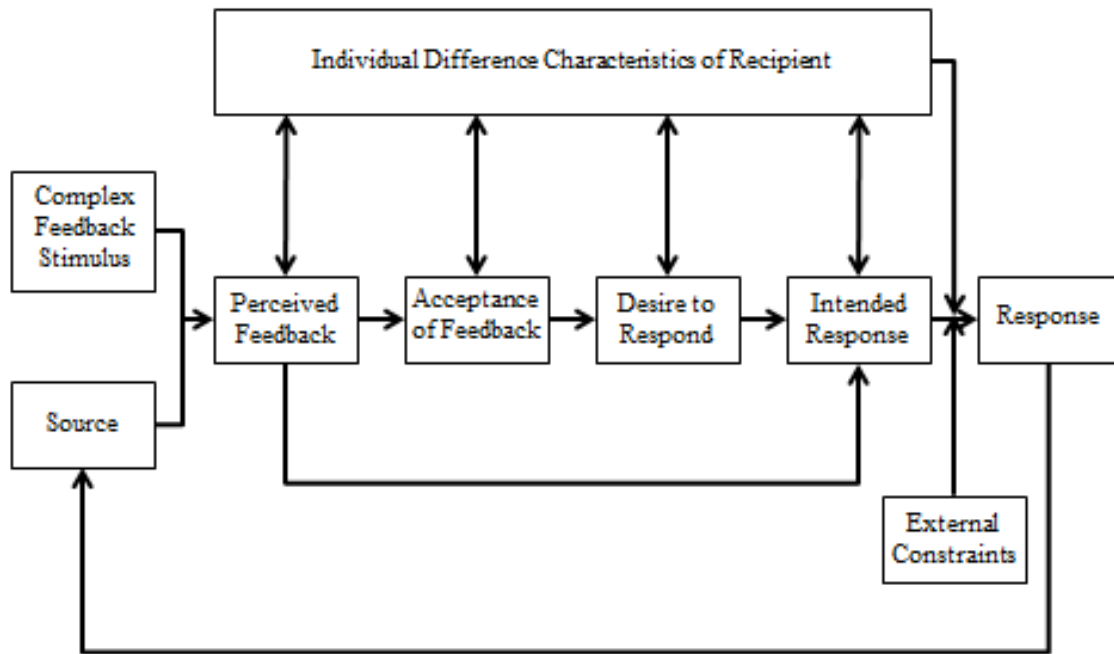


Figure 3: A model of cognitive processes mediating the feedback-response relationship (recreated from Ilgen et al., 1979).

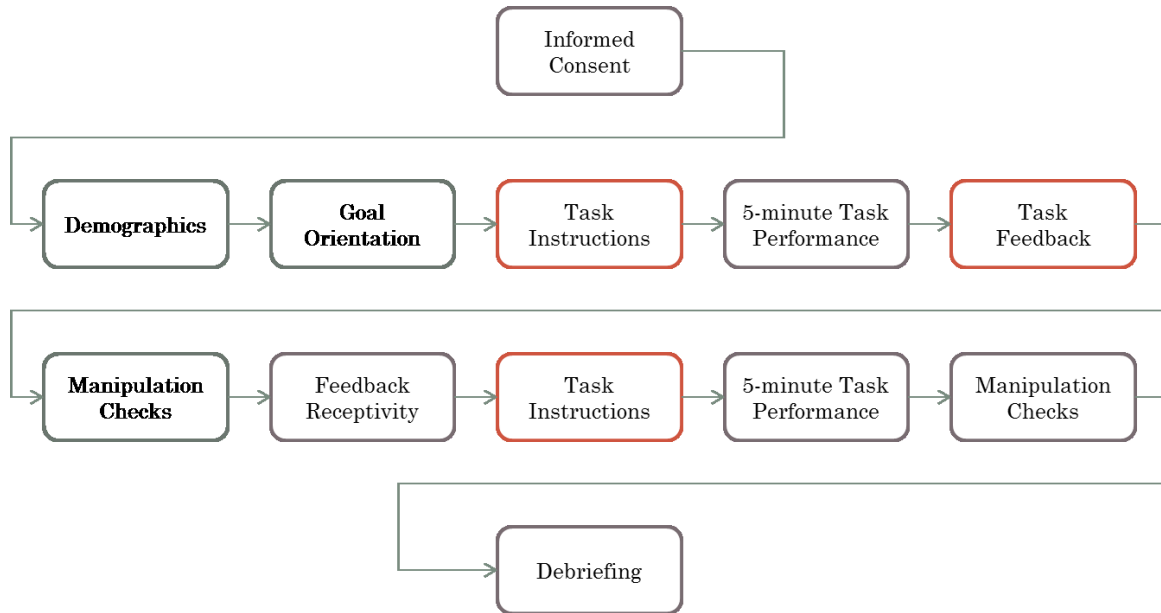


Figure 4: A depiction of the procedural flow of the experiment.

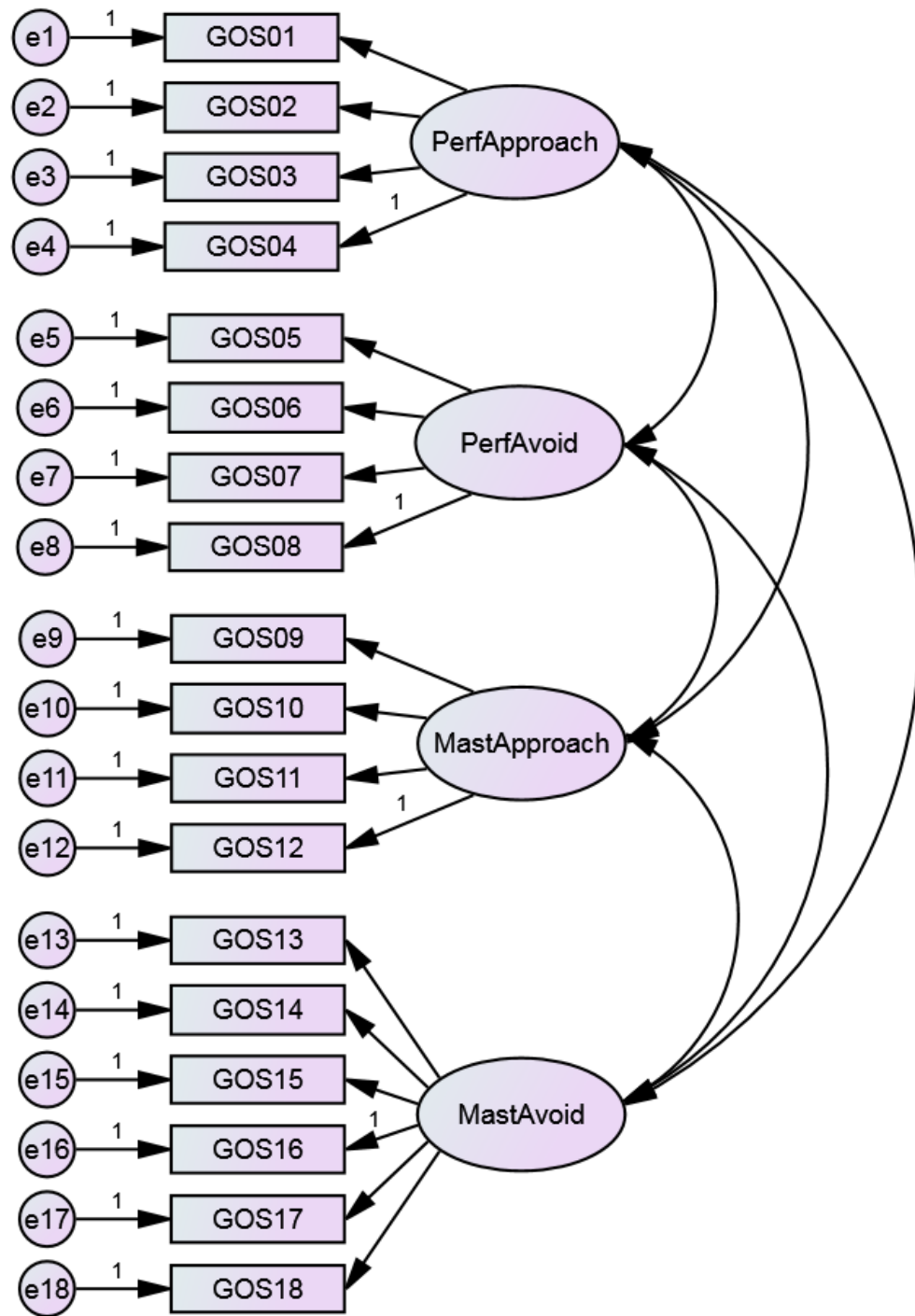


Figure 5: A depiction of the expected structural model of the goal orientation instrument.

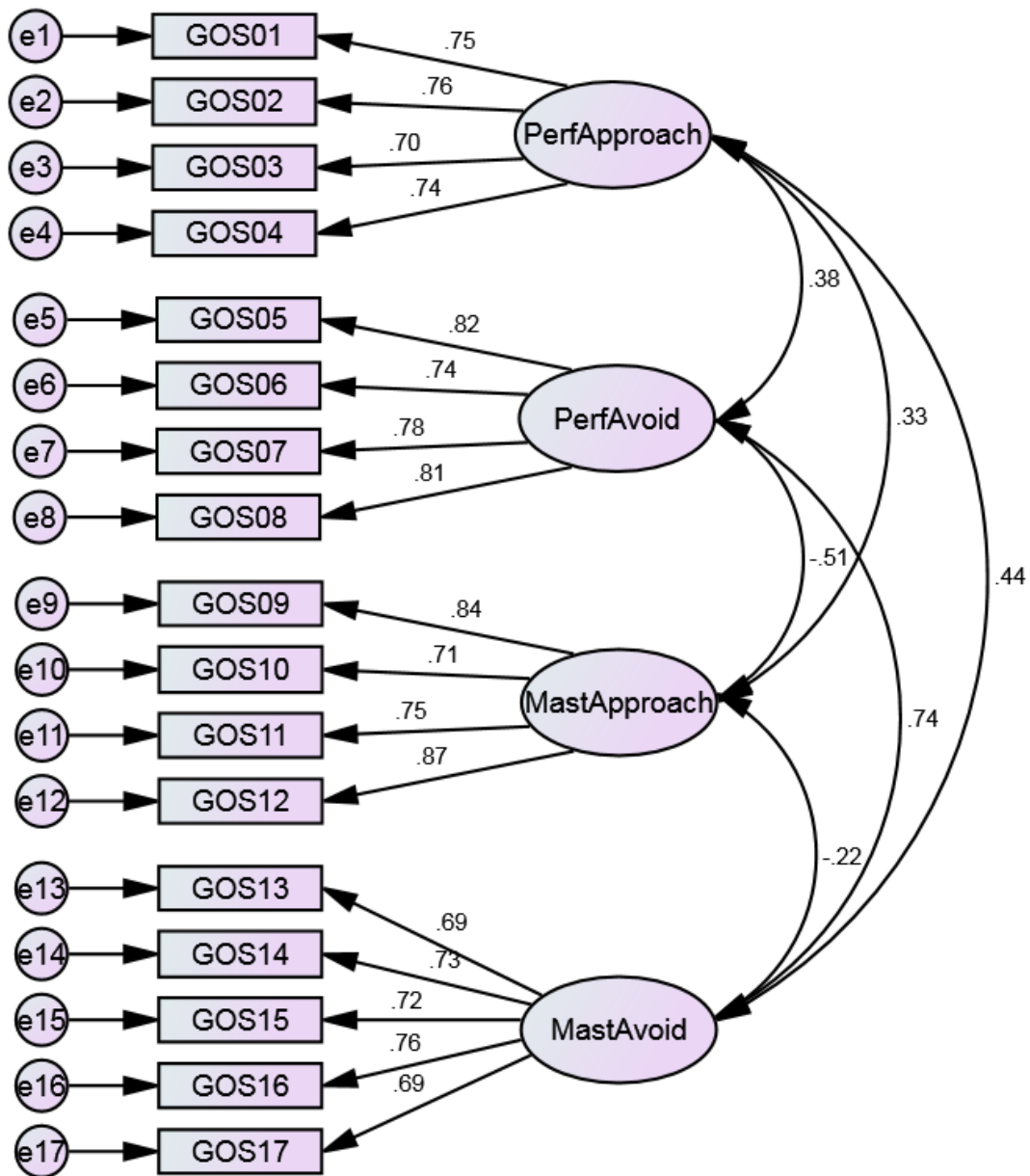


Figure 6: A depiction of the revised structural model for the goal orientation instrument.

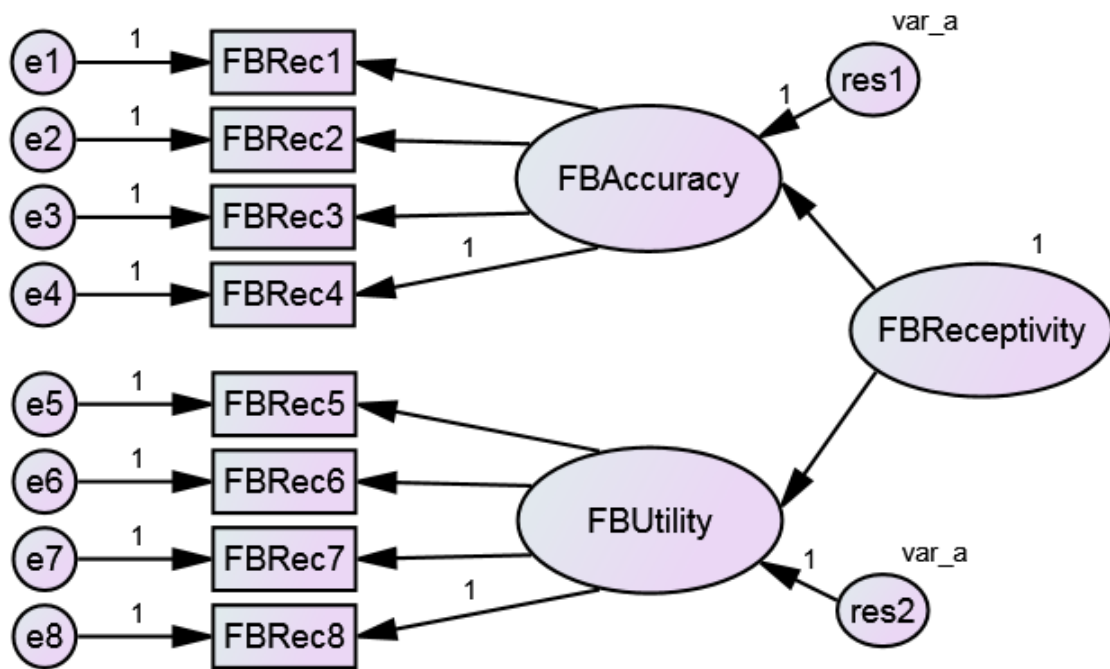


Figure 7: A depiction of the expected structural model for the feedback receptivity instrument.

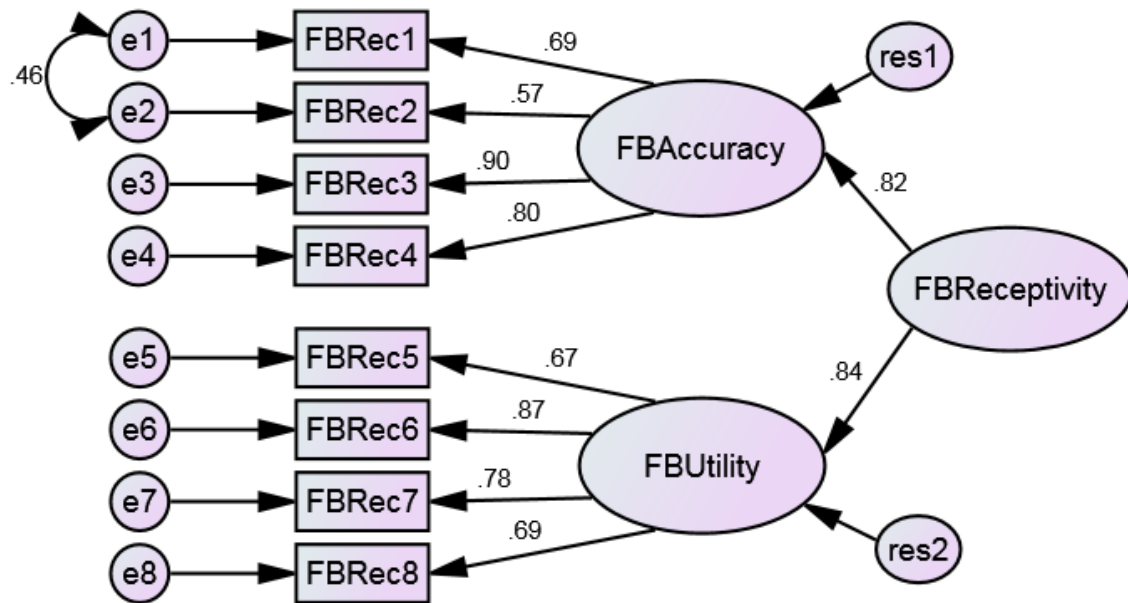


Figure 8: A depiction of the revised structural model for the feedback receptivity instrument.

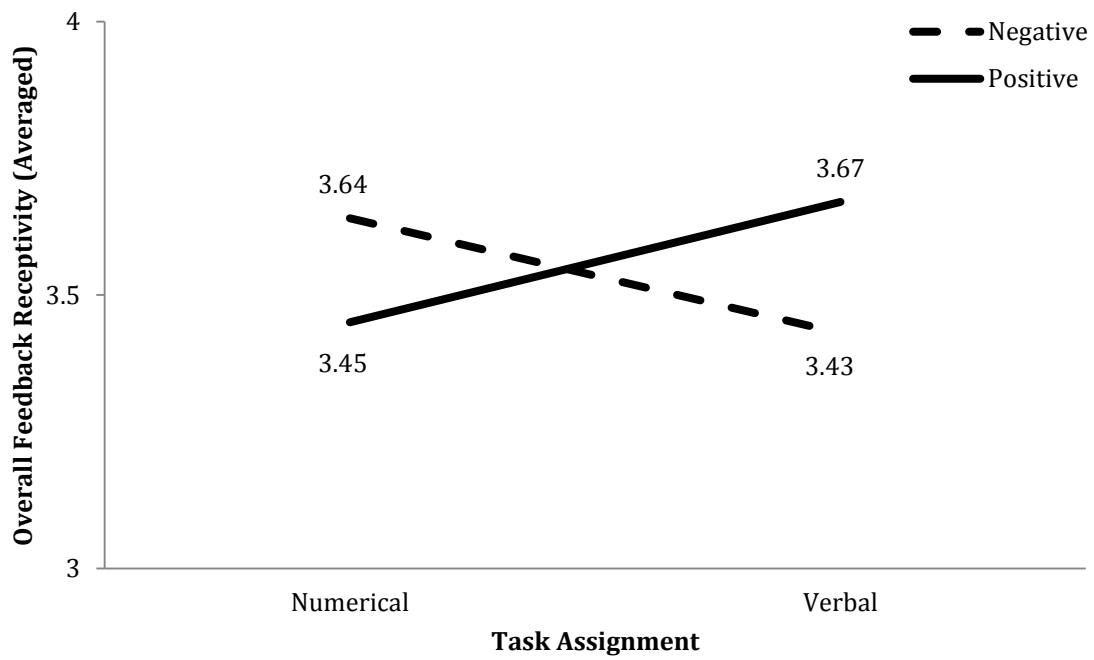


Figure 9: A depiction of the interaction between feedback sign and task assignment.

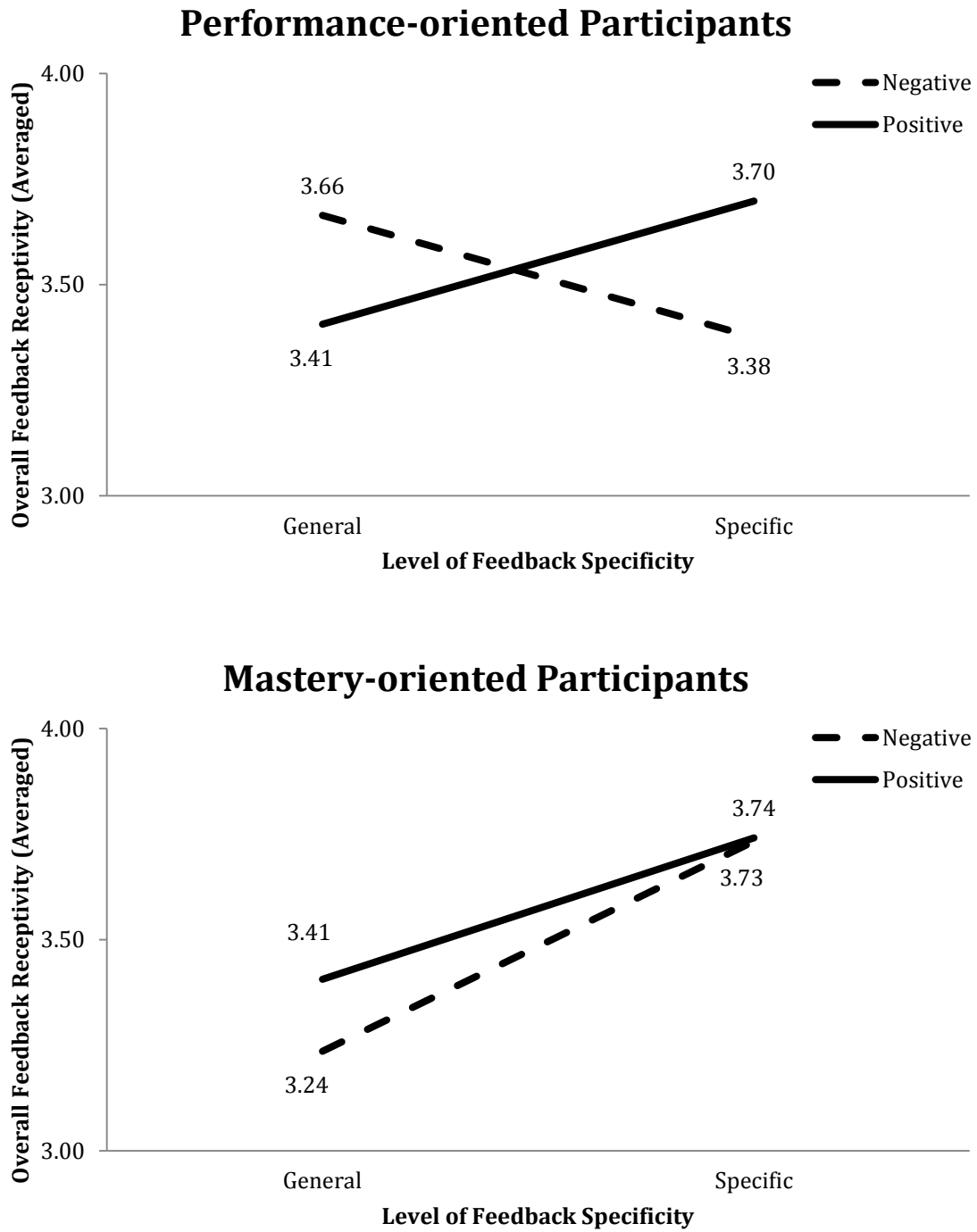


Figure 10: A depiction of the 3-way interaction between feedback sign, feedback specificity, and goal orientation (performance/mastery) on feedback receptivity.

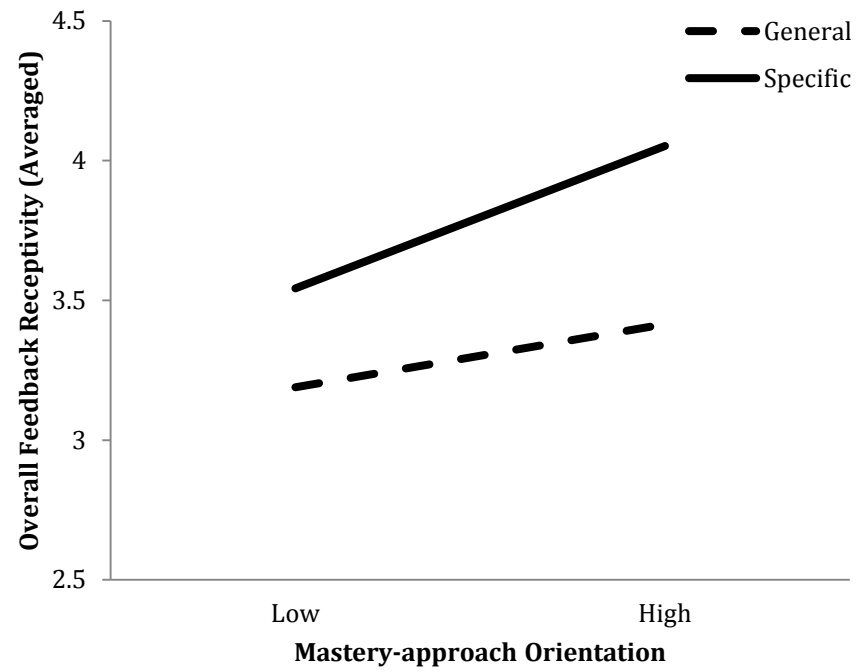


Figure 11: A depiction of the interaction between feedback specificity and mastery-approach goal orientation.

Appendix A: Informed Consent Information

Opening Slide

Thank you for your interest in participating in this study. This purpose of this research is to explore the relationships between an individual's personal characteristics and performance on different types of tasks. Participation in this study will take approximately 30 minutes.

During the experimental session, you will be asked to fill out a series of surveys and to complete two (2) experimental tasks. Neither the surveys nor the tasks contain material that is expected to be harmful in any way. In the event that you find the content discomforting or inappropriate, please feel welcome to contact the researcher directly via email (cwaples@ksu.edu). You may contact Rick Scheidt, the chair of Kansas State University's institutional review board (rscheidt@ksu.edu), if you prefer.

You are free to withdraw your participation from the study at any time, should you wish to do so. If you do so choose, any information collected from you up to that point will be removed from our records permanently.

To receive payment for your participation in this study, it must be completed in full. Additionally, there will be several questions/items included throughout the experimental session to verify your attention to the task. Your responses to these questions/items must be consistent with logic and/or instructions. Failure to respond appropriately will be interpreted as withdrawal from the study, accompanied by deletion of your data from our records and nonpayment.

If you consent to participating in the task, as it has been described, please indicate your consent by selecting the appropriate option below.

Appendix B: Debriefing Information

Upon Cessation of the Experimental Session

Thank you very much for your participation in this research project.

The purpose of this research is to better understand the impact of personal characteristics on their receptivity to different kinds of feedback. Moving forward, the goal is to be able to cater feedback in the workplace to individuals' unique characteristics. If we are successful, this study may help in improving the way feedback is provided, and make it more likely that that feedback leads to improvements in work performance. In addition, it may guide managers providing feedback to do so in a way that will minimize negative-emotional reactions to feedback.

As part of this study, you have received performance feedback that had no relationship with your actual task performance. The feedback itself was formulaic, and determined by your random assignment to experimental conditions. Depending on your conditional assignment, you may have received positive or negative feedback, accompanied by varying levels of detail. Your reactions to that fabricated feedback are at the core of this study.

Basically, the questions we are seeking to answer are: Do your preferences and motivation for pursuing different types of goals make you particularly receptive to specific, positive feedback? Do they instead make you particularly receptive to general, negative feedback? Does your receptiveness to that feedback prompt better performance?

If you have any questions about the research, its design, or its findings, please don't hesitate to follow up with the researcher (cwaples@ksu.edu).

Thanks again for your participation!

Appendix C: Demographic Survey Items

Survey Instructions

Please use the available options/blanks to respond to the following items.

Items to be Assessed

Age (Response blank)

Sex (Select from: Male/Female)

Race (Response blank)

US State of Residence (Response blank)

Occupation (Response blank)

Education Level (Select from: HS or less, Some College, Associate's Degree, Bachelor's Degree, Graduate Degree)

Appendix D: Goal Orientation Items (adapted from Baranik et al., 2007)

Survey Instructions

Please carefully read each of the items below and respond by selecting the option that most accurately reflects how well the statement describes you, in general. Indicate your response by clicking in the circle below your intended choice.

Response Options

Responses will range from 1 (Not at All Like Me) to 7 (Very Much Like Me).

Performance-approach Items

1. I like to show that I can perform better than my peers.
2. I prefer to work on projects where I can prove my ability to others.
3. I try to figure out what it takes to prove my ability to others.
4. I enjoy it when others are aware of how well I am doing.

Performance-avoid Items

1. I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others.
2. Avoiding a show of low ability is more important to me than learning a new skill.
3. I prefer to avoid situations where I might perform poorly.
4. I'm concerned about taking on a task if my performance would reveal that I had low ability.

Mastery-approach Items

1. I am willing to pursue challenging tasks that I can learn a lot from.
2. For me, development of my abilities is important enough to take risks.
3. I often look for opportunities to develop new skills and knowledge.
4. I enjoy taking on challenging and difficult tasks I'll learn new skills from.

Mastery-avoid Items

1. I just try to avoid being incompetent with regard to the skills I use and tasks I perform.
2. When I'm engaged in a task, I find myself thinking a lot about what I need to do to not mess up.
3. I often focus on not doing worse than I have personally done in the past.
4. My goal is to avoid being incompetent at performing tasks and using skills.
5. I just hope I am able to maintain enough skills so I am competent.
6. I am often just trying to avoid performing poorly on tasks I encounter.

Appendix E: Instructions for Numerical Task

Presented Prior to Task Trial 1

For this task, you will be reviewing a series of mathematical equations for accuracy. There will be forty (40) equations to review that use a combination of mathematical operations.

When you click “Next” below, you’ll be taken to the task. Next to each equation, you’ll see two response options: “Correct” or “Incorrect.” After carefully reviewing the equation for accuracy, please indicate whether you believe the equation to be correct or incorrect, accordingly. If you believe that the equation contains an error, please indicate the correct answer in the available response blank.

Once you click “Next,” you will have five (5) minutes to work through the list.

Good luck!

Presented Prior to Task Trial 2

Just as last time, your task will be review the accuracy of a list of mathematical equations. There will again be forty (40) new equations. Please use the available response options for each equation to indicate whether you believe the question to be correct or incorrect. If incorrect, please indicate the correct answer in the available response blank.

Once you click “Next,” you will have five (5) minutes for the task.

Good luck!

Appendix F: Instructions for Verbal Task

Presented Prior to Task Trial 1

For this task, you will be reviewing a series of sentences for grammatical/spelling accuracy. There will be forty (40) sentences to review that may or may not contain errors.

When you click “Next” below, you’ll be taken to the task. Next to each sentence, you’ll see two response options: “Correct” or “Incorrect.” After carefully reviewing the sentence for grammatical/spelling accuracy, please indicate whether you believe the sentence to be written correctly or incorrectly. If you believe that the sentence contains an error, please briefly describe the error in the available response blank (e.g., “should have been it’s, not its,” “comma missing after ‘of course’”).

Once you click “Next,” you will have five (5) minutes to work through the list.

Good luck!

Presented Prior to Task Trial 2

Just as last time, your task will be review the grammatical/spelling accuracy of a list sentences. There will again be forty (40) new sentences. Please use the available response options for each sentence to indicate whether you believe the question to be correct or incorrect. If incorrect, please briefly describe the error in the available response blank.

Once you click “Next,” you will have five (5) minutes for the task.

Good luck!

Appendix G: Performance Feedback – General, Positive

Numerical Task

Well done! Your performance on the task has placed you in the 81st percentile, which means that you outperformed 81% of your peers on the task.

Compared to your peers, your performance was well above-average. You correctly classified five (5) more equations as accurate or inaccurate than the average participant in this study.

Verbal Task

Well done! Your performance on the task has placed you in the 81st percentile, which means that you outperformed 81% of your peers on the task.

Compared to your peers, your performance was well above-average. You correctly classified five (5) more sentences as correct or incorrect than the average participant in this study.

Appendix H: Performance Feedback – Specific, Positive

Numerical Task

Well done! Your performance on the task has placed you in the 81st percentile, which means that you outperformed 81% of your peers on the task.

Compared to your peers, your performance was well above-average. You correctly classified five (5) more equations as accurate or inaccurate than the average participant in this study.

When the errors you detected were compared to the database of errors detected by previous participants, the following three (3) informational flags were triggered:

- 1) Two (2) of the errors you detected are detected rarely or very rarely (less than 5% of participants successfully detected them).
- 2) Of the errors that you did not detect, more than 50% were errors caused by a failure to follow the correct order of mathematical operations.
- 3) As the session progressed, there were longer delays between your identification of errors.

Detecting errors that were frequently overlooked by your peers indicates that you were paying close attention to the right steps in accurately computing the equation. To be successful on the next trial, make sure you continue to carefully examine each problem.

The correct order of mathematical operations is a key consideration in identifying computational errors in the equations provided. To be successful on the next trial, keep the order of operations in mind: 1) parentheses, 2) exponents, 3) multiplication and division, and 4) addition and subtraction.

Delays as the session progresses are common. Don't let them discourage you. Instead, try to get into a rhythm. Spend enough time on each equation to identify errors, but if you are confident that there is no error, move to the next problem.

Verbal Task

Well done! Your performance on the task has placed you in the 81st percentile, which means that you outperformed 81% of your peers on the task.

Compared to your peers, your performance was well above-average. You correctly classified five (5) more sentences as correct or incorrect than the average participant in this study.

When the errors you detected were compared to the database of errors detected by previous participants, the following three (3) informational flags were triggered:

- 1) Two (2) of the errors you detected are detected rarely or very rarely (less than 5% of participants successfully detected them).
- 2) Of the errors that you did not detect, more than 50% were errors caused by a failure to follow the rules of grammatical structure.
- 3) As the session progressed, there were longer delays between your identification of errors.

Detecting errors that were frequently overlooked by your peers indicates that you were paying close attention to the critical rules of grammar. To be successful on the next trial, make sure you continue to carefully examine each sentence.

Grammatical rules are a key consideration in identifying errors in the sentences being presented. To be successful on the next trial, keep common rules in mind: 1) subject-verb agreement, 2) proper use of punctuation, 3) correct use of pronouns, 4) avoidance of sentence fragments, and 5) appropriate inclusion of prepositional phrases.

Delays as the session progresses are common. Don't let them discourage you. Instead, try to get into a rhythm. Spend enough time on each sentence to identify errors, but if you are confident that there is no error, move to the next sentence.

Appendix I: Performance Feedback – General, Negative

Numerical Task

Your performance on the task has placed you in the 29th percentile, which means that 71% of your peers performed better than you on this task.

Compared to your peers, your performance was below-average. The average participant in this study correctly classified five (5) more equations as accurate or inaccurate than you did.

Verbal Task

Your performance on the task has placed you in the 29th percentile, which means that 71% of your peers performed better than you on this task.

Compared to your peers, your performance was below-average. The average participant in this study correctly classified five (5) more sentences as correct or incorrect than you did.

Appendix J: Performance Feedback – Specific, Negative

Numerical Task

Your performance on the task has placed you in the 29th percentile, which means that 71% of your peers performed better than you on this task.

Compared to your peers, your performance was below-average. The average participant in this study correctly classified five (5) more equations as correct or incorrect than you did.

When the errors you detected were compared to the database of errors detected by previous participants, the following three (3) informational flags were triggered:

- 1) Two (2) of the errors you detected are detected rarely or very rarely (less than 5% of participants successfully detected them).
- 2) Of the errors that you did not detect, more than 50% were errors caused by a failure to follow the correct order of mathematical operations.
- 3) As the session progressed, there were longer delays between your identification of errors.

Detecting errors that were frequently overlooked by your peers indicates that you were paying close attention to the right steps in accurately computing the equation. To be successful on the next trial, make sure you continue to carefully examine each problem.

The correct order of mathematical operations is a key consideration in identifying computational errors in the equations provided. To be successful on the next trial, keep the order of operations in mind: 1) parentheses, 2) exponents, 3) multiplication and division, and 4) addition and subtraction.

Delays as the session progresses are common. Don't let them discourage you. Instead, try to get into a rhythm. Spend enough time on each equation to identify errors, but if you are confident that there is no error, move to the next problem.

Verbal Task

Your performance on the task has placed you in the 29th percentile, which means that 71% of your peers performed better than you on this task.

Compared to your peers, your performance was below-average. The average participant in this study correctly classified five (5) more sentences as correct or incorrect than you did.

When the errors you detected were compared to the database of errors detected by previous participants, the following three (3) informational flags were triggered:

- 1) Two (2) of the errors you detected are detected rarely or very rarely (less than 5% of participants successfully detected them).
- 2) Of the errors that you did not detect, more than 50% were errors caused by a failure to follow the rules of grammatical structure.
- 3) As the session progressed, there were longer delays between your identification of errors.

Detecting errors that were frequently overlooked by your peers indicates that you were paying close attention to the critical rules of grammar. To be successful on the next trial, make sure you continue to carefully examine each sentence.

Grammatical rules are a key consideration in identifying errors in the sentences being presented. To be successful on the next trial, keep common rules in mind: 1) subject-verb agreement, 2) proper use of punctuation, 3) correct use of pronouns, 4) avoidance of sentence fragments, and 5) appropriate inclusion of prepositional phrases.

Delays as the session progresses are common. Don't let them discourage you. Instead, try to get into a rhythm. Spend enough time on each sentence to identify errors, but if you are confident that there is no error, move to the next sentence.

Appendix K: Receptivity to Feedback Items

Survey Instructions

Please carefully read each of the items below and respond by selecting the option that most accurately reflects your level of agreement or disagreement, given the feedback you have just been provided. Indicate your response by clicking in the circle below your intended choice.

Response Options

Responses will range from 1 (Strongly Disagree) to 5 (Strongly Agree).

Perceptions of Accuracy Items

1. I think that the feedback I received was accurate.
2. I don't think that the feedback that I received was a fair assessment of my performance. (R)
3. The feedback gave me a good idea of how well I performed on the task.
4. After reading the feedback, it is clear to me how well I did.

Desire/Intention to Respond to Feedback Items

1. After reading the feedback, I am looking forward to improving on the next trial.
2. I think that the feedback I received will help me do better next time.
3. After seeing my feedback, I have some ideas about how to improve.
4. I have no intention of using the feedback to guide my performance on the next task. (R)

Appendix L: MTurk Attention Check Items

Items to be Inserted into Surveys

In an average week, I usually die between three and five times. (Disagree/Strongly Disagree)

Drinking water is an effective way to quench your thirst. (Agree/Strongly Agree)

I am a robot made out of cardboard and decorated with crayons. (Not at All Like Me)

I am a human reading questions on a computer screen. (Very Much Like Me).

Items to be Inserted into Manipulation Checks

Select “Yes” for this item, if you are paying attention.

Type “I am a person” into the text box below.

Appendix M: Manipulation Check Items

Administered after Receiving Feedback

Please briefly describe the feedback you were provided. (Open-ended)

How does your performance on the task compare to your peers' performance? (Open-ended)

Please briefly describe the meaning of a percentile rank. (Open-ended)

On a scale from 1 (very easy) to 7 (very hard), please rate the difficulty of the task. (Scaled)

On a scale from 1 (very negative) to 5 (very positive), please indicate how positive or negative your feedback was. (Scaled)

On a scale from 1 (very general) to 5 (very specific), please indicate how general or specific your feedback was. (Scaled)

Administered after Performance on Trial 2

While performing the task, did you think about the feedback you were provided after your first task? (Yes/No)

Did you actively try to use the feedback you received in order to perform better? (Yes/No)

If yes, please describe how the feedback influenced your task-related actions. (Open-ended)